

80 microcomputing^{T.M.}

Computers Anonymous: Kick the habit. Pg. 30.

Magic:

Build a light pen,
and use it to
control your 80.
Pg. 38.

I Ching:

The program of
changes. **Pg. 123.**

**Mork & Mindy
Monitor:**

Use your
Television as a
computer display.
Pg. 58.

Reverse Video:

Clearer display,
just like reading a
book. **Pg. 54.**

Sound Effects:

With this program
you could make
R2-D2 jealous.
Pg. 68.



Plus:

Software Reviews, Hardware Reviews, Book Reviews:
New column on Assembly Language.
More than 30 articles and columns.

**a trademark of*





The easiest, least expensive way to generate spectacular multi-color graphics, sharp two-color alphanumerics: Your computer, a color tv set and the Percom Electric Crayon™.

Add the Electric Crayon™ to your system and your keyboard becomes a palette, the tv screen your medium.

You dab and stroke using one-key commands to create dazzling full-color drawings, eye-catching charts and diagrams.

Or you run any of innumerable programs. **Your own BASIC language programs** that generate dynamic pyrotechnic images, laugh-provoking animations.

From a combined alphanumerics-semi-graphics mode to a high resolution 256- by 192-element full graphics mode, the microprocessor-controlled Electric Crayon™ is capable of generating 10 distinctly different display modes.

Colors are brilliant and true, and up to eight are available depending on the mode.

As shipped, the Electric Crayon™ interfaces a TRS-80* computer. It may be easily

adapted for interfacing to any computer or to an ordinary parallel ASCII keyboard.

But that's not all

The Electric Crayon is not just a color graphics generator/controller.

It is also a **complete self-contained control computer**. With built-in provision for 1K-byte of on-board program RAM, an EPROM chip for extending EGOS™, its on-board ROM graphics OS, and a dual bidirectional eight-bit port — over and above the computer/keyboard port — for peripherals. The applications are endless.

Shipped with EGOS™, 1K-byte of display memory and a comprehensive user's manual that includes an assembly language listing of EGOS™ and listings of BASIC demo programs, the Electric Crayon™ costs only \$249.95.

Options include:

- LEVEL II BASIC color graphics programs on minidiskette: \$17.95.
- A 34-conductor ribbon cable to interconnect the Electric Crayon™ to a TRS-80*: \$24.95.
- RAM chips for adding refresh memory for higher density graphics modes: \$29.95 per K-byte.
- Electric Crayon™ Sketchpad, a sketching grid of proportioned picture elements (pixels) in a tv aspect ratio. For 128 x 192 or 256 x 192 graphics modes. 11-inch by 17-inch, 25-sheet pads: \$3.95 per pad.

SYSTEM REQUIREMENTS: the video circuitry of the Electric Crayon™ provides direct drive input to a video monitor or modified tv set. An internal up-modulator for rf antenna input may be constructed by adding inexpensive components to the existing video circuitry.

Prices and specifications subject to change without notice.



PERCOM DATA COMPANY, INC.
211 N. KIRBY GARLAND, TEXAS 75042
(214) 272-3421

™ = trademark of Percom Data Company, Inc.

* = trademark of Tandy Radio Shack Corporation which has no relationship to Percom Data Company.

Get into computer color graphics the easy, low-cost way with a Percom Electric Crayon™. Available at Percom dealers nationwide. Call toll-free, **1-800-527-1592**, for the address of your nearest dealer, or to order direct if there is no Percom dealer in your area.



BASIC SOFTWARE LIBRARY NOW ★ 10 ★ Volumes and Growing

IS SPONSORING A

\$10000.00 Give Away

And unlike others we are giving a large portion in CASH that you Don't have to spend with us. You are eligible NOW! You may already be entered. More details in future advertisements.

We have over 100,000 in circulation since 1975 and we are still around and That's more than Anyone else can say. We used to sell hundreds of programs individually, the programs in Volume X were sold for several years at over \$10,000, in Volume III for over \$6,000 but a few years ago we decided to promote software to the mass public and it was an instant success. We are still several years ahead of our time in our marketing concepts as well as our products and we are going to be making another major change in the market. We are going to offer our programs in cassette form. NOT just one of two programs like everybody else. But a book full of programs for just \$9.95.

For Homeowners, Businessmen, Engineers, Hobbyists, Doctors, Lawyers, Men and Women

Vol. I \$24.95	Vol. II \$24.95	Vol. III \$39.95	Vol. IV \$9.95	Vol. V \$9.95	Vol. VIII \$19.95	Vol. IX \$19.95*	Vol. X \$69.95*
Business & Personal Bookkeeping Programs	Animals Four Astronaut Bagel Bio Cycle Cannons Checkers Craps Dogfight Golf Judy Line Up Pony Roulette Sky Diver Tank Teach Me	Binomial Chi-Sq. Coeff. Confidence 1 Confidence 2 Correlations Curve Differences Dual Plot Exp-Distri Least Squares Paired Plot Plotpts Polynomial Fit Regression Stat 1 Stat 2 T-Distribution Unpaired Variance 1 Variance 2 XY.	Beam Conv. Filter Fit Integration 1 Integration 2 Intensity Lola Macro Max. Min. Navaid Optical Planet PSD Rand 1 Rand 2 Solve Sphere Trian Stars Track Triangle Variable Vector	Billing Bonds Bull Enterprise Football Funds 1 Funds 2 Go-Moku Jack Life Loans Mazes Poker Popul Profits Qubic Rates Retire Savings SBA Tic-Tac-Toe	Andy Cap Baseball Compare Confid 10 Descrip Differ Engine Fourier Horse Integers Logic Playboy Primes Probab Quadrac Red Baron Regression 2 Road Runner Roulette Santa Stat 10 Stat 11 Steel Top Vary Xmas	Auto Cypher Hurrtac ID Lorana Map Navigate Omega Patterns Radar RDF	Intro. A/R A/P Mer Inv Check Assets Payroll Bal Sh P/L Year End Data Base Tax Up Basic St.
Bond Building Compound Cyclic Decision 1 Decision 2 Depreciation Efficient Flow Installment Interest Investments Mortgage Optimize Order Pert Tree Rate Return 1 Return 2 Schedule 1 Games & Pictures	A. Newman J.F.K. Linus Ms. Santa Nixon Noel Noel Nude Peace Policeman Santa's Sleigh Snoopy Virgin	APPENDIX A	Vol. VI \$49.95 Mini-Ledger Payroll A/R Inventory Peprec. Ledger	APPENDIX B	Balance Checkbook Instal 78 Deprec 2 APPENDIX C Favorites *10% Discount — Offer good til April 30, 1980		

Add \$1.50 per volume handling, all domestic shipments sent U.P.S. except APO and P.O. Box which go parcel post. Foreign orders add \$6.00/volume for air shipment and make payable in U.S. dollars only.

AVAILABLE AT MOST COMPUTER STORES
Master Charge and Bank Americard accepted.
Our Software is copyrighted and may not be reproduced or sold.

Unlike others we have NOT raised our prices in five years

KEMCO, LTD.

P.O. Drawer 2208E Petersburg, VA 23803

24 hour Hot Line (800) 528-6050
ext. 1184. In Arizona (800) 352-0458

OVER 116,000 IN USE TODAY

LEVEL IV PRODUCTS, INC.

MICHIGAN'S LARGEST *TRS-80** Software House

Welcomes Lance Micklus

PERSONAL

Personal Finance – 2 package program that will maintain your checking account and maintain a file of all your cancelled checks. Thirty-three budgets can be assigned to the checks. A bill estimator helps you to decide who gets paid this month. Cass. \$9.95

Advanced Personal Finance – Budget program automatically collects data from the Checking program. Finance will produce a 30 page report that gives you the total picture of your financial posture. On a 32K disk system the package will handle about 200 checks per month and 900 checks per year.
..... Disk \$24.95

UTILITIES

KVP – Machine language program allows you to build custom routines to control your keyboard, video monitor and printer. Corrects keyboard bounce.
..... Cass. \$24.95
..... Disk \$29.95

KVP 232 – Works like KVP - designed to be compatible with the TRS232 from Small Systems Software..... Cass. \$24.95
..... Disk \$29.95



GAMES

MEAN CHECKERS MACHINE™ – Match your skills against the computer at nine levels of play, from novice to advanced expert computer response time increases accordingly with playing level. Cass. \$19.95
..... Disk \$24.95

Coming Soon – Model II \$29.95

STAR TREK III.4 – One of the most advanced Trek-type games ever written. Explore as much of the galaxy as possible, destroy 20 Klingons and locate five Class M planets. Extensive use of graphics, including 3-D galaxy. Cass. \$14.95

DOGSTAR – Explore a giant space ship while searching for the princess. Try to avoid the guards and attack robots to rescue the princess before she reveals the secret location and strength of her Freedom Fighting Force.
Supports 35 different environments. Cass. \$9.95

** a product of Tandy Corp.

LEVEL IV PRODUCTS, INC. ¹⁴

32238 Schoolcraft Rd., Suite F4 • Livonia, MI 48154
313-525-6200 outside Michigan call 1-800-521-3305

10% off on these listed programs
Please add \$1.50 for shipping.

DEALER ORDERS WELCOME
Open Tues. thru Sat 11-7 E.S.T.

SEND 25¢ FOR OUR NEW WINTER CATALOG

APPLICATION

- 95 **Itinerary.** It's Tuesday, must be London. *Ben Gorsky.*
- 114 **Magazine Index.** Find that article. *William Klungle.*
- 121 **Titler.** Captions for your video. *Mark Rotzien.*
- 123 **I Ching.** The program of changes. *Anthony Scarpelli.*

EDUCATION

- 45 **More Night School.** Continuing education. *Dr. Antonio Lopez.*
- 77 **Pre-School Math.** Teach your kids. *Donald Hastings.*

GAMES

- 60 **Ball Box.** Adventures of a Squot. *James D. Lewis.*
- 116 **Rock, Scissors, Paper.** Play the game! *Dodd Harris.*

GENERAL

- 30 **Computer Derelict.** It could happen to you. *Barry Kornfeld.*
- 98 **A Dealer's Experience.** Even dealers have problems. *S. M. DeFonzo.*

HARDWARE

- 38 **Build a Light Pen.** Your own magic wand. *Wayne Holder.*
- 54 **Reverse Video.** Make your display easy to daer. *Dennis Kitsz.*
- 58 **Mork & Mindy Monitor.** A dual purpose display. *Hugo Jackson.*
- 110 **CTR-41 Modifications.** Bring it up to par. *Delmer Hinrichs.*

REVIEWS

- 70 **RSM-2 Monitor.** Extremely cost effective. *Bruce Churchill.*
- 130 **CBASIC Review.** Now you C it! *Ken Knecht.*
- 136 **dilithium Tapes.** Tapes to read? *Rod Hallen.*

STYLE

- 103 **INKEY\$.** Get rid of superfluous prompts? *Gary Himler.*
- 128 **Break Disable.** Secure your programs. *Jim Rastin.*

UTILITY

- 62 **Level II to Level I.** CLOAD your system. *Mike Wolf.*
- 68 **Babybeep.** Make R2-D2 jealous. *Dennis Kitsz.*
- 80 **Multiple USRs.** Ten instead of one. *John Ventimiglia.*
- 84 **T-BUG For II.** Customize it. *Allen Curtis.*
- 90 **MACROPOKE Monitor.** Poke your 80. *Larry Suter.*
- 106 **Service Tape.** Systemize your utilities. *Howard Flatley.*
- 108 **KBFIX Fix.** Vvery usefull! *C. W. Anderson.*
- 133 **BASIC Terminal.** Straightforward software. *Terry Noreault.*

REGULARS

- | | |
|---|---|
| 8 80 Remarks. <i>Wayne Green.</i> | 16 80 Accountant. <i>Michael Tannenbaum.</i> |
| 8 80 Applications. <i>Dennis Kitsz.</i> | 20 Reviews. <i>Chris Brown.</i> |
| 9 Captain 80. <i>Bob Liddil.</i> | 26 Input. Why not you? |
| 10 Club 80. <i>Ross Wirth.</i> | 28 NEWS. <i>Michael Comendul.</i> |
| 12 The Assembly Line. <i>William Barden, Jr.</i> | 146 Preview. Next month in 80. |
| 15 Unlimited 80's. <i>Sherry Smythe.</i> | 146 Advertisers Index. |

The cover photograph by Reese Fowler shows some of the editorial staff at a lunchtime management meeting.

Editor/Publisher
Wayne Green
Executive Vice President
Sherry Smythe
Corporate Controller
Alan Thulander
Assistant Editor/Publisher
Jeff DeTray
Managing Editor
Jim Perry
Production Editor
Michael Comendul
Editorial Assistants
Emily Gibbs
Susan Murray
Thomas Peabody
Review Editor
Chris Brown
Administrative Assistant
Leatrice O'Neil
Production Manager
Noel Self
Assistant Production Manager
Robin Sloan
Production
Steve Baldwin
James Butler
Bob Drew
Bruce Hedin
Kenneth Jackson
Clare McCarthy
Michael Murphy
Dion Owens
Nancy Salmon
Patrice Scribner
Sue Symonds
John White
Typesetting
Barbara Latti
Sara Bedell
Mary Kinzel
Karen Podzycki
Photography
Bill Heydolph
Tedd Cluff
Terrie Anderson
Reese Fowler
Accounting Manager
Knud Keller
Circulation Manager
Debra Boudrieau
Circulation
Barbara Block
Pauline Johnstone
Bulk Sales Manager
Ginny Boudrieau
European Marketing
Reinhard Nedela
Advertising Manager
Aline Coutu
Advertising
603-924-7138
Kevin Rushalko
Penny Brooks
Nancy Ciampa
Marcia Stone
Jerry Merrifield
Lori Mugford
Louise Holdsworth
Harold Stephens
Phoebe Taylor
Rita Rivard

Manuscripts are welcome at *80 Microcomputing*, we will consider publication of any TRS-80 oriented material. Guidelines for budding authors are available, please send a self-addressed envelope and ask for "How to Write for *80 Microcomputing*." All material to be published will be paid for upon acceptance by the Editor. Address all submissions for the attention of the Managing Editor. Entire contents copyright 1980 by 1001001 Inc. No part of this publication may be reprinted, or reproduced by any means, without prior written permission from the publisher. All programs are published for personal use only, and may not be reproduced for others. All rights reserved.

80 Microcomputing (ISSN # applied for) is published monthly by 1001001 Inc., Pine Street, Peterborough, NH 03458. Application to mail second class postage rate is pending at Peterborough, NH 03458 and at additional mailing offices. Phone: 603-924-3873/4. Subscription rates in the U.S. are \$15 for one year and \$40 for three years. In Canada \$17 for one year and \$46 for three years. In Europe please contact Monika Nedela, Markstr. 3, D-7778, Markdorf, W. Germany. In South Africa contact *80 Microcomputing*, P.O. Box 782815, Sandton, S. Africa 2146. All other foreign subscriptions \$20 (one year only) surface mail. All U.S. subscription correspondence should be addressed to *80 Microcomputing*, Subscription Department, P.O. Box 981, Farmingdale, NY 11737. Please include your address label with any correspondence. Postmaster: Send form #3579 to *80 Microcomputing*, Subscription Services, P.O. Box 981, Farmingdale, NY 11737.

META TECHNOLOGIES 20

Fellow TRS-80 User:

I'd like to thank you for your interest in our products and, as our president, Bob Fiorelli, promised in our March ad, tell you something about MTC Customer Service. Customer Service begins when we take your order, but doesn't end there. Even though your order is tracked by computer, it receives the personal attention only a concerned human being can provide. The order is checked and rechecked at each stage of processing to ensure that you get exactly what you ordered, at the price you expected to pay. Even with all the care your order is given, it will normally be shipped within one business day. About thirty-percent of all orders received each day are from prior customers. We constantly seek to improve the products and services we offer you, our valued customer.

I'd like to present three items of particular interest. First, our BYTE-BACK customer response cards, included with most of our products. These pre-addressed, postage-free business reply cards offer you a simple way to tell us what kind of job we're doing, and to let us know what kind of products you're interested in. Remember, the more products you buy, the more chances you have to BYTE-BACK!

Second, MTC's exclusive QUE cards. Having worked with the TRS-80 since 1977, we can appreciate the fact that our customers want to use the features of powerful products, like APPARAT's NEWDOS+, as soon as possible. MTC has responded to this need with the introduction of the Quick User Education (QUE, pronounced "CUE") card. While not included with all our products, QUE cards provide the new user with the information needed to make immediate use of a product, without lengthy study of accompanying documentation.

Third, MTC's product upgrade policy. It has always been our view that when a product is enhanced, purchasers of earlier releases should be allowed to upgrade to the newer release for a portion of its cost. MTC is interested in having you as a customer for a long time. We make every attempt to keep you informed about new releases and offerings within each product line.

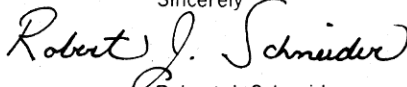
Speaking of new products, did you notice REMSOFT's REMASSEM-1 and H. C. Pennington's "TRS-80 DISK AND OTHER MYSTERIES", from IJG, Inc? We don't generally offer non-MTC products. It's usually a matter of not meeting our standards. But we're really impressed with these two. We feel the addition of these products will complement our Technical Bulletin Service quite nicely.

Because these ads are made up well in advance of the publishing of the magazine in which they appear, products may be available that do not appear in the ad. For example, APPARAT's long-awaited, expanded NEWDOS, tentatively called NEWDOS-80, is due for initial release this month. If it's available, MTC will be selling it. Some other things to look for from MTC include additional audio cassette-based educational products. An enhanced version of AIDS-II, tentatively called AIDS-II+, featuring expanded field definition, sorting and selection capabilities is being readied. Look for some new AIDS-II subsystems, also. TDAM, MTC's answer to the enigma of random files, is only the first of several "function interpreters". Look for similar products for screen and printer handling. Finally, watch for an integrated general business and accounting package (A/P, A/R, G/L & Payroll) on the Model II, for less than \$200! It features user-defined account numbers, financial reports and more.

Just one more thing. A customer-appreciation month is planned in 1980 (we're not saying when). For one month, and one month only, we will sell a box of diskettes for \$19.80. Sorry, one box per customer.

We at MTC look forward to providing you with the quality products and service you deserve and should expect. If we offered you anything less, we wouldn't be Meta Technologies Corporation.

Sincerely



Robert J. Schneider
Customer Service

TRS-80 and Radio Shack are registered trademarks of Tandy Corp.

mTc-SHIRTS

HIGH-QUALITY, POLY-COTTON BLEND T-SHIRTS. White with Navy Blue neck and sleeve "ringers". MTC logo on sleeve. Top quality transfers of your choice on front.

Specify size (S,M,L,XL) and Transfer:

- META TECHNOLOGIES MAKES EVERY BYTE COUNT!
- DON'T TOUCH MY BITS!
- RAM it!
- MICRO LOVERS TAKE SMALLER BYTES!

mTc-SHIRTS.....\$5.95

FILESORT.....\$29.95
For Model II.....\$49.95

Sort ASCII files by any combination of user-specified fields: ascending or descending, numeric or non-numeric keys. Optionally retains original file.

MAILSORT(Model I).....\$19.95

MAILSORT replaces existing sort in Radio Shack Disk Mailing List® system. Sort by any combination of fields, such as NAME, within CITY, within STATE. Hi-speed in-memory routine sorts 300 records in approximately 60 seconds. Minimum 32K recommended.

MTC AIDS-II

Ailing information? Doctor it up with AIDS-II. This Automated Information Directory System is user-defined, features user-specified fields and print/display formats, conditional record selection, updating of fields within records, sorting by any combination of fields, and much more! Unique "windowing" capability allows directories of unlimited size. Window size is typically 200 or more records in 32K. Can be used for mailing lists, client reference reporting, appointment "calendars", inventory records and other information systems. Easy to use. Defining a system takes about a minute. Formatting a report or defining a custom label, less than 30 seconds. Sorting 200 records takes less than 5 seconds. Add "subsystems" for additional capabilities.

MTC AIDS-II.....\$49.95

For Model II.....\$79.95

CALCULATION SUBSYSTEM (CALCS)

Use for report generation involving basic manipulation of numeric data, such as quantity & cost computations, balances carried forward and columnar totals. Expands capabilities with respect to inventory, accounting and other numeric-based information systems.

MTC CALCS.....\$24.95

For Model II.....\$39.95

MAILING/INFORMATION LIST SUBSYSTEM (MAILS)

Use for report & label generation involving formatting of primarily non-numeric data, such as custom, "N-up" and "N-copy" label forms, index-type report formatting, and sub-fielding capabilities for selection & print. Expands AIDS-II with respect to client/product reference systems, mailing lists and other non-numeric information systems.

MTC MAILS.....\$24.95

For Model II.....\$39.95

RECORD/FILE ORGANIZATION EXECUTIVE (REFORGE)

Use for expanding, contracting or reformatting AIDS-II files. Convert random & sequential files to AIDS-II format. Use for converting mailing lists to AIDS-II. Includes MERGE & PURGE capabilities for combining smaller files into larger ones and removing duplicate records.

MTC REFORGE.....\$24.95

For Model II.....\$39.95

PEEK&POKE.....\$14.95

Frustrated because PEEK and POKE have been removed from Model II BASIC? Satisfy your curiosity with PEEK&POKE from MTC. Included are 8-bit and 16-bit (LSB, MSB) self-relocating machine language routines, instructions, and demo program.

Transfer PROGRAMS and DATA from MODEL I to MODEL II

TRAN-SEND

\$49⁹⁵ by MTC

Requires MODEL II and MODEL I with disk & RS-232. Simple to use, not a kit - nothing else to buy. Complete with custom cable, 5 1/4" & 8" floppies, instructions. May be used over phone lines. Custom Cable only.....\$19.95

Suitable for use with Radio Shack® transfer program(ACT 0131)

MAKES EVERY BYTE COUNT

IN YOUR TRS-80® MODEL I OR MODEL II DISK SYSTEM

PROGRAMMING TOOLS

Buy 4, get 1 **FREE**
Any 5, \$79.80
For Model II \$119.80

★ NEW ★

TDAM \$19.95
For Model II \$29.95

Having trouble with RANDOM FILES? With MTC's Table-Driven Access Method (TDAM) you'll never fret over FIELDING again. No knowledge of random access files is required. Insert the TDAM "interpreter" into any BASIC program and type in a few DATA statements describing the information in your files. TDAM does the rest! Reads and writes fields and records of any type (even compresses a DATE field into 3 bytes!). Features automatic file buffer allocation/deallocation, memory buffering, sub-record blocking/deblocking, and handles up to 255 fields per record. Super fast and super simple! Complete with TDAM interpreter, instructions and demo program.

DIVERGE \$19.95
For Model II \$29.95

Compares two BASIC program files, showing the differences between them. Identifies & lists lines which have been inserted, deleted, & replaced. Use for version control.

REBUILD \$19.95
For Model II \$29.95

Reorganize programs for adding program code, faster execution, readability. Much more than simple renumbering. Rearrange groups of statements within a program - automatically updates references to line numbers. Use with SUPERSEDE and MINGLE for maximum effect.

SIFTER \$19.95
For Model II \$29.95

Twelve in-memory high-speed sorts for use in any BASIC program: stable, non-stable, with/without tags, for numeric or string data. Random File Sort included. Some sorts written in machine code. Includes sort subroutines, demo programs and instructions. Relocate as needed with REBUILD.

SHRINK \$19.95
For Model II \$29.95

Makes Every Byte Count! Make programs smaller and faster! Combines lines & removes unnecessary code including remarks, without altering program operation. Typically reduces program size 25% to 40%.

SUPERSEDE \$19.95
For Model II \$29.95

A "must have" for the professional programmer or the serious amateur. Probably one of the greatest time-savers available. Write programs in shorthand - change variable names - generate program documentation - use with REBUILD and MINGLE to build new programs from old ones.

MINGLE \$19.95
For Model II \$29.95

Merge two files (Program or Data) into a single file. Data files may be merged in ascending or descending sequence with the ordering based on a user-specified comparison field. A very handy utility for consolidating data files.

Single sided, Single density, Soft-sectored

DISKETTES

Verbatim 5¼-inch

\$24⁹⁵
Box of 10

Hard-sectored (10-hole), Box of 10 \$26.95
8-inch FLOPPIES
Single-density, Box of 10 \$29.95
Double-density, Box of 10 \$39.95

PLASTIC LIBRARY CASES

5¼-inch or 8-inch diskette case \$3.25
5¼-inch or 8-inch diskette case
(when purchased with each Box of 10) ... \$3.00

FACTORY FRESH, ABSOLUTELY FIRST QUALITY
Minimum order 1 box, NO order limit!

Complete for Model I with all utilities
Plus exclusive MTC QUE card!

NEWDOS + II
\$99⁹⁵ by Apparat
and MTC

40 TRACK VERSION \$109.95
includes REF, RENUM, SUPERZAP,
EDITOR/ASSEM, DISASSEM, DIRCHECK, and
more! This is the original NEWDOS with all of Apparat's utility programs, plus any 2 MTC PROGRAMMING TOOLS (for Model I), of your choice. Includes exclusive MTC QUE (Quick User Education) card.

MTC TECH B.S.

Our exclusive Technical Bulletin Service reveals the inside story on the TRS-80® I & II. Sent by first class mail, bulletins are issued as the news breaks, not just once a month. Expensive, but worth it! No advertising or flyers, just pure Technical B. S.! Cancel any time - unused balance refunded. Free year-end subject index with 12-month subscription. Subjects have included "PEEK&POKE functions for Model II", "Machine Language Sort for String Arrays", "Tandy Marketing Plans", and "Level II Memory Locations". Subscriptions may be back-dated to obtain previous Bulletins.

1-Year Subscription
(Includes free index) \$36.00
Monthly Subscription \$3.00/mo.

Let your TRS-80® Teach You ASSEMBLY LANGUAGE

REMSOFT's unique package, "INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING" includes ten 45-minute lessons on audio cassettes, a display program for each lesson providing illustration & reinforcement, and a text book on TRS-80® Assembly Language Programming. Includes useful routines to access keyboard, video, printer and ROM. Requires 16K - Level II, Model I.

REMASSEM-1 \$69.95

The perfect supplement for your
NEWDOS+, from IJG, Inc.

"TRS-80 DISK AND OTHER MYSTERIES"

by Harvard C. Pennington

132 pages written in PLAIN ENGLISH packed with HOW TO information with details, examples and in-depth explanations. Recover lost files and directories, remove file protection, make BASIC programs unlistable. How to use SUPERZAP, recover from DOS errors and MORE!

TRS-80 DISK \$22.50

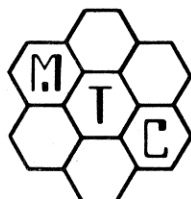
All products
guaranteed for
replacement only.
Prices, Specifications &
Offerings subject to
change without notice.

**MOST ORDERS
SHIPPED
WITHIN ONE
BUSINESS DAY**

**QUANTITY
DISCOUNT
INQUIRIES
INVITED**

WE ACCEPT
• VISA
• MASTER CHARGE
• CHECKS
• MONEY ORDERS
• C.O.D.

• Add \$2.50 for
shipping &
handling
• \$2.00 EXTRA
for C.O.D.
• Ohio residents
add 5½% sales tax.



TO ORDER CALL TOLL FREE
1-800-321-3552
IN OHIO call (216)289-7500 (COLLECT)

META TECHNOLOGIES CORPORATION

26111 Brush Avenue, Euclid, Ohio 44132



✓ 20

800226
© TM TANDY CORP.

80 REMARKS

by Wayne Green

"Every new version of BASIC seems to have more flexibility, speed or simplicity."

In view of the several terrible failures by other publishers in getting microcomputer magazines started in recent months, I was more than satisfied by the response to the first two issues of *80 Microcomputing*. After seeing the first copies, dealers started to call asking for more.

I received a nice letter from President Lew Kornfeld of Radio Shack, saying he was impressed with the magazine. Radio Shack had feared that ads for accessories might hurt sales of their own, but evidence that *80* is supporting their product should have a very positive dollar effect for Radio Shack.

While some users may want to go the route of alternate suppliers for accessories, many will prefer to stay with Radio Shack and their support, including fast service. The fact that Radio Shack is keeping secrets from TRS-80 owners could tarnish their image and give substantial impetus to those who may buy accessories from alternate sources. If these products are so terrifying to Radio Shack, they really must be good, might go the reasoning.

The 50,000 copies of the first issue are going rapidly. We still have some available, but we are no longer accepting Charter Subscriptions which start with the first issue.

Standard Language

There are complaints now and then about BASIC not being standardized for microcomputers. I've thought about this a good deal and my answer is this: Thank heaven there is no standard BASIC. This would mean that we could not continuously improve the software system. The fact is that present day BASIC is enormously better than the original Dartmouth version.

Every new version of BASIC seems to have more flexibility, speed, or simplicity. There are some remarkable enhancements of the TRS-80 BASIC ROM in the works and many enhancements of the disk operating system (DOS). Some of the newer DOS products are far ahead of even the Apparat improved TRSDOS, which I understand is the subject of a lawsuit between Tandy and Apparat.

Radio Shack is planning improvements as well. I understand they now have a new supplier of keyboards and hopefully the key-bounce problem will be resolved. One of the problems with the Radio Shack software fix is that other utility programs use the same memory area and wipe out the debounce routine. This routine also slows down the rate at which data can be entered, causing considerable grief to fast typists.

The TRS-80, supported by other firms, has developed to a point equal to the S-100 bus sys-

tem about two years ago. Had Radio Shack standardized on the S-100 bus and the accessories developed for that system, TRS-80 owners would have had music generating systems, speech recognition, computer voice, plotters and telephone modems much earlier.

Radio Shack is doing its best to keep up with the demand for hardware accessories and software, but the demand is far beyond what they can meet. Furthermore, some of the accessories are needed in more modest quantities and would not be profitable for RS to develop and market. I suggest that RS aid and assist firms providing this type of support as they have much to gain and little to lose.

Past Lives

In my February editorial I mentioned that during therapy a patient often must resolve past life problems before present life situations can be helped. In view of that, I was fascinated to run across a book called *Past Lives Therapy*. The therapy is quite similar to that used by myself and others with whom I corresponded some thirty years ago. An Ace paperback (no. 65245X), it goes into what the author thinks is a

new type of therapy which he has used for the last ten years. The price: \$2.25.

Whether past lives and their problems are real or not makes no difference. The results are the same when you treat them as you would a current life trauma. Though the author makes no claims, this book does come up with some powerful evidence that reincarnation is a fact.

I mentioned, too, that we appear to see recorded memories of many lives tied in with our present life memories. The book presents further evidence that memory is truly in some other dimension and that the brain is merely a switchboard or computer able to access it.

Public broadcasting's recent Nova series on the brain repeated the fact that no one yet knows where memory is or how it works. All we have is some poor communication with it via the brain. I think the microcomputer and its logical method of searching memory will be able to help therapists improve this communication substantially.

I'll be interested in any experiments which evolve in this field. Searching memory is really a very mechanical situation and one which is ideal for the computer. ■

80 APPLICATIONS

by Dennis Kitsz

"I hope to control my own little environment using the TRS-80." Putting another load of wood into my stove to ward off the chill of Vermont's sub-zero environment, I reread this first letter in response to my column. Here's a man who wants to know how to make his 80 work for him. Is the door really, locked, I ponder, keeping this novice from leaving the prison of the computer?

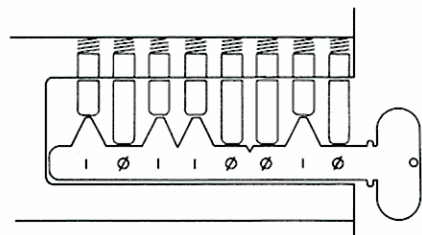
Perhaps it seems so, but there is always a key. A proper key fits into the lock, turns the cylinder, and the door opens revealing that environment outside.

The door to a computer's outside world is called a "port", and the TRS-80 contains 256 of them. Let's try one. Run this program, and listen:

```
10 Y=100
20 FOR X=1 TO 100
30 OUT 255,4:FOR Z=1 TO Y:NEXT Z
40 OUT 255,0:FOR Z=1 TO Y:NEXT Z
50 Y=Y-1
60 NEXT X
```

Now change the first commands in line 30 to OUT 255,8. Run it again, and watch.

Inside the computer, this door numbered 255 will open and close at our command, yet all the other doors remain locked. How can they be opened? If you use a matching key, the doors will fall aside, opening up the passage-way to your "environment." So let's take a look at that lock and key:



This is a crude key, you can see, because there are either teeth rising to a single height, or

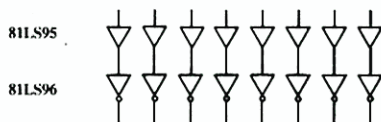
no teeth at all. Our computer thinks of these teeth as voltages. We think of them in terms of numbers. (A tooth is a high voltage, a one; no tooth is a low voltage, a zero.) Our key number "code" looks like this:

10110010

We've got to read this key's code, so stay with me; it's binary time. Quick now! Remember how some of us learned math? The one-in-the-hundreds-place-and-the-seven-in-the-tens-place-and-the-eight-in-the-ones-place make ... 178, of course. Well, then here's 178 in binary:

128's	64's	32's	16's	8's	4's	2's	1's
place	place	place	place	place	place	place	place
1	0	1	1	0	0	1	0
128	0	32	16	0	0	2	0

Below is the schematic of the electronic lock's tumbler, waiting to be set to match our code for port 178. The triangle is a buffer, a piece of hardware that protects the TRS-80 from our explorations. The triangle with the circle at its point is an inverter, which reverses the value of the signal reaching its input:



However elementary it may seem, this is the central scheme of operation of a digital device. If we tap into our electronic "tumblers" before the inverters, our lock will open to a key of all ones; after the inverters, it will open to a key of all zeros. Next month we will build a prototype lock that we can set to open with any one of our remaining 255 keys.

So, here is your assignment, and it's a long one: get a low-wattage soldering iron and practice soldering small parts. Borrow, build or steal a 5-volt regulated power supply. Look in the ads in *80 Microcomputing*, and order some integrated circuits: three 81LS95, one 81LS96, two 74LS75 and one 74LS30.

Also, you'll need a TRS-80 edge connector. Dig up a small transistor radio earphone, a 100-ohm resistor, and a small "breadboard." Finally, take February's issue to bed and fall asleep learning a little about how binary and hexadecimal numbers work. See you next month—don't forget your homework!

Update

In February's Applications column, KBEEFIX plunged along too fast in 32-character mode. Make one change: alter byte 7FAF from 7E to 00. In the BASIC version, change the last value in DATA line 50 from 126 to 0.

CAPTAIN 80

by Bob Liddil

Here's Captain 80, in his Software Secret Agent disguise, all set to get the scoop on what's up in the TRS-80 world this month. Dressed in tan trenchcoat and Sam Spade hat, I blend in quite naturally with the computer store I'm visiting here in Cincinnati.

Standing here in disguise and listening to a salesman pitch a piece of TRS-80 software to an interested customer reminds me of a visit only a week before to a computer shop in Nashua, New Hampshire. Both stores lean heavily on the Apple and the other appliance computers for their hardware sales. But there the similarity ends.

The Cincinnati owner has adopted a live and let live attitude toward the 80. He supports it with software in his store—mostly games. After all, the 80 is not his mainstay. He wisely regards TRS-80 owners as computerists. He knows that the new 80 owner is not sophisticated in software or hardware, so the owner nurtures him along, towards the day when he will move out of his 80 and into a color generating, joysticking Apple or whatever. Smart owner.

The other scorns the TRS-80 to anyone who will listen. There is no 80 software on his pegboard.

The Cincinnati store is out in the boonies, a fair clip from almost anywhere residential, but a popular place for micro enthusiasts to gather, even considering the drive. The Nashua store is in the middle of a good sized city, but was nearly deserted when I was there.

The moral to all this is simple. If your local computer shop does not stock software for your TRS-80, it is because he does not want to. Get on his case about it. If that fails, find a shop that WILL support your computer and support HIM. Tell your friends about the place. Show him he's made the right decision.

Simulated Flight

At Instant Software, things are really hummin'. Although they've de-emphasized game programs (sigh), that does not seem to have affected the quality of what they are producing. Indeed, there is a marked improvement. In the forefront are two new flight programs preparing to join the already tremendously popular Air Flight Simulation and Air Mail Pilot. They are two separate new packages, Night Flight and Jet Fighter Pilot.

Jet Fighter Pilot is an event. It simulates any one of an array of military jets with such authenticity as to leave you breathless. One sequence goes like this: Set Flaps, 0 to 100 percent; Engine, spin turbine, add fuel at 4500 RPM (less than that causes a fire); Throttle, 120 percent (afterburners on); Launch, your choice, steam catapult from a carrier or land launch; Landing Gear (up); Attitude, -180 to 180 degrees.

Now that's just to get the thing into the air! If you want to fly it, be prepared for full maneuverability; fully functioning airsurface controls; drop tanks; navigational computer; functional weapons computer; guided missiles; an enemy to fight. All this in 16K BASIC!

Traditional Graphics

Automated Simulation's Temple of Apschai program is unique. It uses the more traditional graphics technique to present its dungeon-oriented theme instead of the highly touted, but limited Adventure word recognition system.

Beginning the game is the Innkeeper routine. I must confess that in all my years as a dungeon player and computerist I have never come across a salesman as hard to deal with as this Innkeeper. His job is to extract as much gold from you, towards the purchase of the things you need to go down into the temple. You, of course, try to get the goods as cheaply as possible. The computer argues and bargains with you like an Arab rug salesman! It is extremely amusing and realistic.

Before you actually begin to play, it is a good idea to sit down with the documentation that is supplied with the program, a Coke and a big bag of chips. Much of what you need to know about Temple of Apschai is contained in the pages of a colorfully covered manual of history, geography and monster biology.

If Temple of Apschai played as well as it is documented, it might be worth \$24.95. The fact that you must constantly refer back to the manual for descriptions of where you are and what you face is a constant irritation, at least to a novice. The quasi-real-time mode of the game allows you to be ambushed and munched in the time it takes to figure out what you're dealing with.

While there is a lot for the hard core Dungeon player, and obviously, exhaustive work has made the package appealing, there just isn't \$24.95 worth of computer program here.

Business Oriented

I have had a chance to visit several software distributing houses in the past few months and talked to their head reviewers. They, like ISI, agree that to get a game published is going to take a special product. Programmers take note: All these publishers are becoming increasingly oriented toward business and educational programs.

Utilities still have a good market as would any good DOS that could be inexpensively added to disk packages.

That's it for this round. Keep those cards and letters coming in for the contest (outlined in last month's column), some of the ideas so far are terrific. ■

CLUB 80

by Ross Wirth

*"Maury is responsible
for keeping up an old
family history with the
help of the TRS-80."*

Maury Dyer serves as coordinator for a genealogy special interest group (3110 Tawny Oak Dr., San Antonio, TX 78230).

Maury is responsible for keeping up an old family history. When first received it was many pages of tables with almost 1200 family names.

With a "little bit of knowledge of what a computer can do, and a lot of enthusiasm" Maury has begun to rewrite his family history with the help of the TRS-80. In addition to producing a book of family tables and narratives, Maury is producing a "Data Book" of indices to the data base. This list of data indices will be used as a reference to assist in research, particularly on field trips. Maury says he has rewritten his programs many times, but still does not have an "ideal" system.

If you are interested in genealogy, pass along your ideas and programs to Maury.

• • • • •

Attention Bostonians: Given sufficient interest a Boston-based genealogy group is being formed. For further information contact Doreen Ushakoff (c/o Center for Communications Inc., 110 Cabot St., Beverly, Mass. 01915).

High School Science Sig

This is a group of high school teachers who use a TRS-80 in teaching science courses. The Sig facilitates the exchange of ideas and programs for tutorials, practice problems, class demonstrations, laboratory simulations and laboratory data manipulation. Games that can be used to teach a particular topic are also highly desired.

If you teach high school science this Sig is for you. Temporary coordinator is Richard A. Marble (c/o Casady School, Box 20390, Oklahoma City, OK 73156). Please send copies of any programs you have developed to Richard. If you purchased the program or it is copyrighted just send the name of the program source. Given a sufficient number of entries a list of available programs will be published. Any profit from this Sig will be used to purchase additional software for the active members.

Amateur Radio Nets

If you are an amateur radio operator you may be interested to know about the scheduled nets for owners and users of the TRS-80. I am currently aware of seven regularly scheduled nets that hold roundtable discussions on topics of interest to TRS-80 owners. The only requirement for any of the nets is an interest in the TRS-80 and, of course, a license to get on the air.

1. SSB PHONE 21.440 MHZ net control NOADN
M-W-F 2300 Hrs. GMT
2. SSB PHONE 14.342 MHZ net control WA6YKH
(West coast)
Sunday 1900 Hrs. GMT
Another net normally follows this net for swapping programs and program information.
3. SSB PHONE 14.342 MHZ net control WD8SAS
(East Coast)
Sunday 2300 Hrs. GMT
4. CW CODE 7.145 MHZ net control WD8SAS
Sat.-Sun. 0000-0100 Hrs. GMT
5. CW CODE 14.060 MHZ net control VE6AMW

- Daily 0300-0400 Hrs. GMT
6. RTTY 14.075 MHZ net control WB6VOG
Daily 0300-0400 Hrs. GMT
7. RTTY 14.085 MHZ net control WA4AJY
Sat.-Sun. 2200-0100 Hrs. GMT

I am happy to hear from you to learn your ideas and thoughts on the content of this column. Please send your comments to me at 15906 E. 96 St. N., Owasso, OK 74055. Please enclose a self-addressed stamped envelope for personal replies. ■

Anchorage TRS-80 Users Group
PO Box 10
385 South Station
Anchorage, AK 99511

Arizona TRS-80 Users Group
c/o R. Warren
4322 East Fairmont
Phoenix, AZ 85018

Augusta TRS-80 Users Group
PO Box 2143
Augusta, ME 04330

CSRA Computer Club
PO Box 284
Augusta, GA 30903

Dayton Area TRS-80 Users Group
231 Green St.
Dayton, OH 45402

Greater Kansas City TRS-80 Users Gp.
8909 Wenonga
Leawood, KS 62206

Madison TRS-80 Users Group
c/o P. Daly
430 Jean St.
Madison, WI 53703

Mid Peninsula TRS-80 Users Group
c/o C. King
925 Forrest Ave.
Palo Alto, CA 94301

San Jose TRS-80 Users Group
C.S. Shanks
3490 Bon Air Court
San Jose, CA 95117

Texas TRS-80 Users Group
c/o G. Perkins
5224 Winifred Dr.
Ft. Worth, TX 76133

Tandy Computer Users Group
c/o Rod Wright
8205 Chivalry Rd.
Annandale, VA 22003

TCUG
c/o R. Daly
2617 42nd St. NW #2
Washington, DC 20007

Tidewater TRS-80 Users Group
PO Box 10281
Norfolk, VA 23513

TRS-80 Club
c/o J. Lindsly
8106 Quailwood CT
West Chester, OH 45069

TRS-80 Group of Southwest Indiana
c/o M. Anderson
PO Box 3284
Evansville, IN 47732

TRS-80 Nibblers
2555 Hesperian Blvd.
Hayward, CA 94545

TRS-80 Users Group
Radio Shack
Park Row at Collins
Arlington, TX 76010

TRS-80 Users Group
245 Mapleview Rd.
Cheektowaga, NY 14225

Tulsa TRS-80 Users Group
PO Box 1133
Tulsa, OK 74101

TRS-80 Users Group
712-C Country Wood
Walnut Creek, CA 94598

Continue to page 15

THERE IS A DIFFERENCE IN TRS-80 DISK DRIVES CAPACITY

Expansion interface – gives your TRS-80 the disk capacity it needs, and much, much more!

10 to 40 MByte, 8" Winchester drive – expands capacity far beyond Model II storage.

Single sided minifloppy – up to 150 KBytes of storage capacity.

Single or double sided 8" floppies – up to 2.5 MBytes in dual drive cabinet – for the serious TRS-80 user.

NOW: ALL DRIVES COMPATIBLE WITH MODEL II

LOBO DRIVES' new family of disk memory products provides you with a choice of memory capacities you need to effectively execute the complex business software you've developed for your TRS-80*. LOBO DRIVES' selection of readily available, software compatible drives permits you to expand your inventory, payroll, customer list, and accounts receivable files as your business grows.

And LOBO DRIVES brings you more... a new plug-in expansion interface that provides an easy way to add hardware enhancements, communications capability, and programmable features... and it comes with the LOBO DRIVES famous 1 year, 100% parts/labor warranty.

Call or write for the complete LOBO DRIVES story. Find out just how competitively priced a family of high capacity drives can be...



935 Camino Del Sur Goleta,
California 93017.
(805) 685-4546

"CAN YOU REALLY AFFORD
TO PAY LESS?"

Quantity discounts available –
Dealer inquiries invited

Yes, I want to know more about LOBO Drives and what they can do for my TRS-80. Send me information on:

- | | |
|---|---|
| ☐ 5 1/4-in. Floppy drive | ☐ 8-in. Winchester hard disk, 10 Mbyte drive |
| ☐ 8-in. Floppy drive
Single sided
Double sided | ☐ Double density
expansion interface |

Name _____

Company _____

Address _____

City _____ State _____ Zip _____

Phone No. _____

If dealer, provide resale no. _____

*TRS-80 is a registered trademark of Radio Shack, a Tandy Company.

THE ASSEMBLY LINE

by William Barden, Jr.

"I'll provide tutorial material on the more difficult aspects of assembly language and some . . . useful routines . . ."

This is the first of what I hope will be many columns devoted to TRS-80 assembly language programming. Judging from articles I've read and comments I've heard at users' groups, many of you are interested in assembly language. I'll provide tutorial material on the more difficult aspects of assembly language and some useful assembly-language routines that you can use with BASIC programs or other assembly-language code.

Why Use Assembly Language?

There are three reasons to use assembly language on the TRS-80: Speed; efficiency of storage and challenge.

We can safely say that assembly language is anywhere from 100 to 300 times faster than BASIC. This rate can turn a two hour sort into 30 seconds, or a pathetic lunar lander creeping

*"... assembly language is
... from 100 to 300 times
faster than BASIC."*

downward into an impressive real-time simulation of a moon landing!

Not only is assembly language fast, but it uses memory efficiently. It's relatively easy to fit a turn key mail list program written in assembly language into about 2K bytes, whereas the corresponding BASIC version uses 16K bytes.

Furthermore, assembly language is challenging! Maybe you're the guy who took clocks apart when he was six years old and is now building an intricate scale model of the *Nostramo*. Assembly language is perfect for you! It has more parts than any grandfather clock.

In addition assembly language enables you to ferret out some of the deep, dark secrets of Radio Shack, Microsoft, Apparat and ACS. We've got to keep them honest, you know.

The Other Side of the Cassette

There are some drawbacks. One of the chief reasons for not using assembly language is that program development time is much greater than a high-level language such as BASIC. As a matter of fact, developing assembly language programs may require ten or more times the effort of the corresponding BASIC program.

Another disadvantage to assembly language is that it does take more time to learn.

A third disadvantage is that it is not as "self-

documenting" as BASIC—you can't look at an assembly language listing and see what is going on as easily as a BASIC listing.

The advantages and disadvantages must be weighed. If you would like to increase your programming knowledge, speed up some of the slow parts in your BASIC programs, and if you like head cheese, garlic and old Pinky Lee reruns, then assembly language is for you. First of all, I recommend a good book on TRS-80 assembly language. Since the TRS-80 uses the Z-80 microprocessor, a good text on assembly language for the Z-80 is fine. I'll be expanding on concepts from Z-80 programming texts. One book that I recommend is Radio Shack's *TRS-80 Assembly-Language Programming* by William Barden, Jr. (no relation). A second necessary book is the manual that comes with the Radio Shack Editor/Assembler package. This contains the operating instructions for the Editor/Assembler in a form reminiscent of IBM manuals. (You know the information is in there somewhere, but you have to wade through 200 pages to find it.)

A third book you should procure is the *Z-80 Assembly-Language Programming Manual* from Zilog, the original manufacturer of the Z-80. This book is the definitive source book for how all Z-80 instructions operate, and the material in the back of the Editor/Assembler is simply a rehash of the Zilog book.

The fourth item that is a real help is some sort of Z-80 programming reference card. Zilog has a good one called the *Zilog Z-80 CPU Programming Reference Card*. Another reference guide, the *TRS-80 Assembly-Language Reference Book*, written by myself, lists not only the material found in the Z-80 card, but all material for Z-80 programming on the TRS-80. It is available for \$4.95 from Micro Applications Mission Viejo, CA.

The reference cards above are more convenient to use than thumbing through hundreds of pages while looking for that elusive instruction.

Using the above references, familiarize yourself with the architecture of the Z-80 microprocessor, the instruction set and the addressing modes. Don't panic when faced with the 700 or so separate instructions of the Z-80! Would you believe that all 700 can be broken down into three instructions! I didn't think you would.

Seriously, folks, the instructions can be grouped into only dozens of instructions. The secret in learning the Z-80 instructions is not to be intimidated by what are really very simple instructions when treated individually. None of them are as complex as "PRINT USING" or some of the string functions in BASIC. Just take them one at a time and hack away at them,

and before long you'll be using them automatically.

Radio Shack, Apparat and Microsoft

Of course, besides the reference texts, you'll need some utility software to edit and assemble Z-80 instructions. First is the Radio Shack Editor/Assembler, an excellent package. It allows you to store source (the unassembled text for the assembly language program) and object (the assembled machine language output) files on cassette. Editing is easily and quickly done by a line-oriented editor, and the assembler portion has enough bells and whistles so that the AL programmer doesn't suffer.

Cassettes are a nuisance, but for those of us with disk systems, there is Apparat's version of EDTASM. They've added a few niceties such as alphabetized symbol table printout, but the

*"Don't panic when faced
with the 700 separate
instructions..."*

basic Editor/Assembler is still the same. Which would I recommend? If you have a disk system, then the heartbreak of cassette tape is unnecessary.

Radio Shack does have a disk Assembler. This is the Microsoft Macro Assembler. The Macro Assembler generates macros, a type of "in-line subroutine." While the Macro is an excellent assembler, its use is not as straightforward as either the Radio Shack EDTASM or the Apparat disk assembler, and we won't be referencing it in this column, unless I receive an outpouring (inpouring?) of mail from irate Macro Assembler users.

To pacify Microsoft, I will mention another Editor/Assembler package from Bellevue, EDTASM-PLUS. EDTASM-PLUS has the basic Radio Shack EDTASM plus embellishments on the editor (move a block, copy a block, others), macro and in-memory assembly capability (object code automatically placed in memory) and a completely redesigned DEBUG package called Z-BUG. (Where do they get those names!)

The price? A phenomenal \$29.95! Using this package, an AL programmer can edit, assemble and debug without ever touching a cassette or disk.

Although EDTASM-PLUS is cassette-based, Microsoft does plan a disk version, for

Continue to page 14

TRS-80 MOD 11

Complete financials from the complete computer company.

From the STRUCTURED SYSTEMS GROUP: the following programs from require CP/M™ and CBASIC. Select a specific area to computerize while building a totally interactive system written in compiled Basic.

GENERAL LEDGER — Interactive and flexible system providing proof and report outputs.

ACCOUNTS RECEIVABLE — Open item System with output for internal aged reports and customer-oriented statement and billing purposes.

ACCOUNTS PAYABLE — This System provides complete information necessary for management information in the form of Aged Trial Balance, Cash Flow Analysis, Pre-check Reports and the Check Register.

INVENTORY — The System provides businesses with up-to-date and accurate information on the quantity, value, and activity of their inventory items.

CP/M VERSION 2.0 — Complete with assembler, text editor, debugger and various utilities plus full documentation.

CBASIC-2 — Disk Extended BASIC Non-Interactive BASIC with pseudo-code compiler and runtime interpreter.

From DIMENSION DELTA — Fill your specific needs by selecting any combination of the five packages available or select a fully integrated system consisting of all five. Accounts Receivable, Accounts Payable and Payroll automatically provide input to the General Ledger. In addition, each of the five packages is capable of operating independently. Flexible design accommodates most companies without expensive custom modifications.

GENERAL LEDGER — Timely, accurate and well organized financial information keeps the user in full control of his business.

ACCOUNTS RECEIVABLE — Converting excess receivables to cash while maintaining good customer relations is the goal of this system.

ACCOUNTS PAYABLE — The System forecasts cash requirements based on discount dates or due dates and ages past due receivables.

PAYROLL — Departmental totals each pay period and monthly summaries of earnings and deductions help management control personnel costs.

INVENTORY — The System maintains detailed information on each inventory item including the part number, description, unit of measure, vendor and reorder data, item activity, and complete information on current item costs, pricing, and sales.

To order by phone or for local dealer information call: **713/661-2005**
Texas residents add 6% sales tax • MasterCharge • Visa

HOUSTON MICRO-COMPUTER TECHNOLOGIES, INC.

Home and Business Computer Specialists

5313 BISSONNET • BELLAIRE • TEXAS • 77401 • 713/661-2005

THE ASSEMBLY LINE

From page 12

which I (blush) wrote the reference manual. EDTASM-PLUS is by far the greatest thing going for AL programmers, and I don't feel at all guilty about recommending it.

AL Project One: Musical Tones

In the remainder of this column, I'll discuss one of the more interesting applications of TRS-80 assembly language, generating musical tones. The musical tones can be played when driven by a BASIC program, or used as a warning enunciator or siren. In the process of developing the tone AL code, we'll be touching on the important assembly-language concepts of output, timing and loops. A square-wave tone can be generated by turning the cassette output on and off. The frequency of the tone produced is inversely proportional to the cycle time of the on and off periods, as shown in Fig. 1.

As some of you know, the cassette is controlled by a four-bit (four binary digit) latch in the CPU section. This latch has an address of 255 decimal or OFFH hexadecimal. Try the following BASIC code if you have Level II BASIC:

```
100 OUT 255,1
200 OUT 255,2
300 GOTO 100
```

In this horrendously complicated program, the two lower bits of the cassette latch are alternately turned on and off. They lead to some electronics which pulse the cassette output first one way and then the next.

If you listen to the output by writing a tape, or by a small audio amplifier connected to the cassette output, you will hear a buzz-sawish tone. This tone is the highest pitched tone we can achieve with BASIC because of the "overhead" of interpreting the BASIC statements.

In assembly language, we can use the same scheme to achieve much higher pitched tones. In fact, we can go from 0 cycles per second, or hertz, to over 30,000 hertz. The basic scheme for doing this is to emulate the BASIC OUT command by the equivalent AL command OUT. Here's the assembly language version:

```
LOOP LD A,1 ;1 to A
OUT (OFFH),A ;output 1 to port 255
LD A,2 ;2 to A
OUT (OFFH),A ;output 2 to port 255
JR LOOP ;back to LOOP
```

The two OUT instructions perform exactly as the BASIC OUT: They output the value in A to output port 255 (OFFH). The JR is a Jump Relative, which branches the program back to the instruction at LOOP. Here, then, we have a very "tight" loop.

We can easily find out how long the LOOP takes by adding up the times of the instructions. The times of the instructions are provided in the



Fig. 1.

previously mentioned Zilog manual, EDTASM manual or reference cards.

Looking at the OUT instruction, for example, we find that it takes 11 T cycles (each cycle is ¼ microsecond or .25 millionths of a second) or a total time of 2.75 microseconds. The catch is that the times listed in much of the documentation are for a Z-80 running at 4 megahertz, or 4 million cycles per second.

The TRS-80 runs at about 1.774 megahertz, so adjust each 4 MHz instruction time for the lower clock rate by multiplying by 4/1.774 or 2.255. By doing this the LD instructions take 3.95 microseconds, the OUT instructions take 6.2 microseconds and the JR takes 6.765 microseconds for a total loop time of 27.065 microseconds. This loop time corresponds to a frequency of 36,948 hertz. This is the maximum frequency that we can get out of this approach.

Few tunes require this high a pitch unless there are some in the canine repertoire I'm forgetting. One objective, then, is to reduce the frequency we can obtain by adding padding between the OUTs. In fact, we must control the amount of padding or time delay in order to generate many different tones. We must ultimately end the loop above; as it stands, it is endless.

Here's a version that has a variable amount of time delay:

```
TONE LD BC,-1 ;DECREMENT VALUE
LOOP PUSH DE ;TRANSFER FREQ COUNT
```

```
POP HL ;TO HL
LD A,1 ;"ON" VALUE
OUT (OFFH),A ;TURN ON CASSETTE OUT
LOOP1 ADD HL,BC ;FREQ CNT-1
JP C,LOOP1 ;LOOP IF NOT -1
PUSH DE ;TRANSFER FREQ COUNT
POP HL ;TO HL
LD A,2 ;"OFF" VALUE
OUT (OFFH),A ;TURN OFF CASSETTE OUT
LOOP2 ADD HL,BC ;FREQ CNT-1
JP C,LOOP2 ;LOOP IF NOT -1
JR LOOP ;CONTINUE
```

The time delay here is controlled by a count initially in the DE register pair. This count is transferred from register pair DE to register pair HL by the PUSH DE and POP HL. This PUSH, POP sequence is commonly used to load one register pair with the contents of another.

The time delay is implemented by decrementing the count in HL by adding -1 in the BC register. A DEC is not done to HL because performing an ADD HL, BC will reset the C(carry) flag when the count is decremented from 0 to -1; a decrement of a register pair affects no flags! The carry flag is tested by the JP C,LOOPx, which loops back if there is a carry (HL register pair not -1). A JP is used in place of a JR because it is somewhat faster.

The timing loops for "on" and "off" take about 11.83 microseconds for each loop. Since the count in HL may be 1 to 65536, this allows for frequencies of less than two hertz and greater than 20,000 hertz, ignoring the other overhead. The timing loop is also very tight, making the resolution for individual frequencies fairly good.

At this point, we are almost done. The program above, however, is still an endless loop. We need some control over the duration of the tone.

```

00100 :*****
00110 :      TONE SUBROUTINE
00120 :*****
00130 :
7F00      00140      ORG      7F00H      :CHANGE ORG FOR YOUR SYSTEM
7F00      0000      00150      FREQ      DEFW      0      :FREQUENCY COUNT
7F02      0000      00160      DURA      DEFW      0      :DURATION COUNT
7F04      DD2A027F  00170      TONE      LD      IX,(DURA) :LOAD DURATION COUNT
7F06      ED5B007F  00180      LD      DE,(FREQ) :LOAD FREQUENCY COUNT
7F0C      01FFFF    00190      LD      BC,-1 :DECREMENT VALUE
7F0F      D5        00200      LOOP      PUSH      DE      :TRANSFER FREQ COUNT
7F10      E1        00210      POP      HL      :TO HL
7F11      3E01      00220      LD      A,1      : "ON" VALUE
7F13      D3FF      00230      OUT      (OFFH),A :TURN ON CASSETTE OUT
7F15      09        00240      LOOP1     ADD      HL,BC :FREQ CNT-1
7F16      DA157F    00250      JP      C,LOOP1 :LOOP IF NOT -1
7F19      D5        00260      PUSH     DE      :TRANSFER FREQ COUNT
7F1A      E1        00270      POP      HL      :TO HL
7F1B      3E02      00280      LD      A,2      : "OFF" VALUE"
7F1D      D3FF      00290      OUT      (OFFH),A :TURN OFF CASSETTE OUT
7F1F      09        00300      LOOP2     ADD      HL,BC :FREQ CNT-1
7F20      DA1F7F    00310      JP      C,LOOP2 :LOOP IF NOT -1
7F23      DD09      00320      ADD      IX,BC :DURATION COUNT-1
7F25      DA0F7F    00330      JP      C,LOOP :CONTINUE IF NOT DONE
7F2B      C9        00340      RET      :RETURN TO CALLING PROG
0000      00350      END
00000 TOTAL ERRORS

DURA      7F02      00160      00170
FREQ       7F00      00150      00180
LOOP       7F0F      00200      00330
LOOP1      7F15      00240      00250
LOOP2      7F1F      00300      00310
TONE       7F04      00170

```

Table 1.

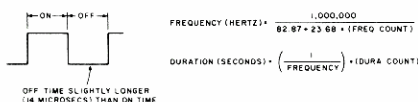


Fig. 2.

Because we have used most of the general purpose registers we will have to use one of the index registers, IX, to hold a duration count. This works out very nicely, since we can decrement the count in IX by performing an ADD IX,BC and testing the C(arry) flag directly after. The final version of TONE is shown in Table 1, assembled at RAM memory location 7F00H. Reassemble TONE based upon the size of your memory.

To use TONE with a BASIC program, first load the AL tone program as a SYSTEM tape or disk file. Then load BASIC and protect RAM by entering the appropriate MEMORY SIZE response.

In the BASIC program, first POKE locations 7F00H/7F01H with a frequency count of 1 through 65535. If FC is the frequency count, then perform POKE 32513,INT(FC/256), followed by POKE 32512,FC-INT(FC/256)*256. POKE locations 7F02H/7F03H(32514,32515) with a duration count in the same fashion.

Next, set up a USR call for Level II or Disk BASIC as outlined in the BASIC manual. The starting address is at 7F04H(32516). Set up the address alone, as no other arguments need to be passed except by the POKes previously done. Then, execute a USR call to output the tone.

To use TONE with other assembly language code, simply LD locations FREQ and DURA with the frequency and duration counts and CALL and TONE subroutine.

The formulas for finding the actual frequency of the tone are shown in Fig. 2. A table of frequencies can be compiled by using this formula in a short BASIC program. The duration count for TONE must be adjusted for frequency to output notes of the same duration. DURA is 500 for a one second tone of 500 hertz and 1000 for a one second tone of 1000 hertz, for example.

"Best match" to standard musical note values can be chosen by reference to a table of note frequencies and the tone formula. Sirens and other sound effects can be generated by combining short duration tones of varying frequency.

Next month, we'll be discussing the infamous TRS-80 keyboard and ways to read all the keys and a few more. We'll also cover relocatability, not to be confused with changes of address.

In the meantime, I'd be interested in hearing from you about your solutions to the following problem: Give a number, find the integer portion of its square root in a short assembly-language routine. For example, given 137, find the 11 portion of 11.7047 in a short piece of code. The reader with the shortest program will be mentioned in dispatches in a later column. Write: 28182 Palmada, Mission Viejo, CA 92692. ■

UNLIMITED 80's

by Sherry Smythe

New Hampshire, now one of the top growth states in the country has become particularly proliferated with new mail order businesses. This is ideal for an essentially rural state and particularly good for persons wanting to move out of the cities and start their own businesses.

In the southwestern part of the state a new microcomputer mail order firm recently got started, MOM's of Marlborough, some twenty miles west of Peterborough. You'll be seeing more and more mail order ads from MOM's.

Not being exactly new to microcomputers, the people at MOM's wanted to start with a computerized system of handling orders and inventory. They contacted Instant Software for advice about support and decided to go with a TRS-80 Level II system with 32K of memory and three disks. ISI was well along with tests on a disk-oriented accounts receivable and payable program which seemed ideal for the MOM's application. Thus, the new firm was helped and ISI had a suitable test for its new program package.

Several software packages were looked over before the decision was made, including software packages from a half dozen different publishers.

MOM's needed a program which would handle the daily orders, keep a mailing list for sending out catalogs, print orders for packing, labels for mailing, and be expandable to handle the inventory when that grows beyond a small card file.

The ISI program can handle 1500 transactions with up to 760 accounts per disk and even print monthly reports. One other major benefit was the on screen prompts, adequate for even an inexperienced operator.

Since a good deal of the time is spent on looking for job lots of computer equipment to sell, it was important that as much of the MOM's operation be automated and computerized as possible. The TRS-80 system has worked out well in this respect and an automatic phone answering system has freed the MOM's people to search for more goodies. They are concentrating on microcomputer and car gadgets for the present. ■

From page 10

TRS-80 Users Group of Arizona
Rod Purcell, President
6218 W. Marlette
Glendale, AZ 85301

TRS-80 Users Group
7465 Holliston Ave.
Suite 232
Goleta, CA 93017

TRS-80 Users Group of SW Houston
c/o B. Taylor
3723 Purdue
Houston, TX 77005

TRS-80 Users Group
c/o J. Hill
2203 Cord St.
Indianapolis, IN 46224

Phoenix TRS-80 Users Group
1850 East Maryland #27
Phoenix, AZ 85016

Portland TRS-80 Users Group
c/o J. Warner
13485 SW Driftwood
Beaverton, OR 97005

Redwood Empire TRS-80 Users Group
c/o John Revelle
7136 Belita Ave.
Rohnert Park, CA 94928

Pacifica TRS-80 Users Group
c/o J. Strazzarino
338 Alida Way #306
South San Francisco, CA 94080

TRS-80 Users Group
c/o C. Manis
1516 Dallas St.
Killeen, TX 76541

TRS-80 Users Group
Klaus Rittenback
Rt. #1, Box 8
Milton, NY 12547

TRS-80 Users Group
621—13th Ave. South
Onalaska, WI 54650

Wichita Valley TRS-80 Users Group
PO Box 4391
Wichita Falls, TX 76308

TRS-80 Users of Houston
6900 S. Rice
Bellaire, TX

TRS-80 Users Group Ottawa
2 Larsen Ct.
Kanato, ONT, Canada K2L 1Y8

TRS-80 Users Group
3825 North 26th St.
Tacoma, WA 98400

80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

*"When you are satisfied
that all the data is entered
just select 'calculate'
and sit back."*

An unexpected result of our high rate of inflation has been the large increase in the number of taxpayers who are now required to file long form tax returns. Although the Internal Revenue Service has made a valiant attempt to make the forms more readable, tax preparation time is still a headache for most Americans. One possible cure for "tax return blues" is the neighborhood tax preparation center. There, for a moderate fee, you can get your return prepared by an "expert."

Aardvark

However, as an 80 owner you can save the carfare to the tax center. You can spend the small fee to purchase software which will turn your trusty microcomputer into an instant tax expert. As with all purchases of 80 software the problem in making a selection is that there are too many choices. Therefore, since the price seemed reasonable in relation to the features offered, I ordered the Aardvark software Micro Tax III package.

In a short time I received a book and two cassettes containing the Micro Tax programs. Although I have a disk system, I ordered the tape version and, when I attempted to place the programs on disk, I ran into immediate problems. In time I found a solution, but the time lost wasn't worth the ten dollars I had saved.

There are two sets of user instructions, one for Micro Tax II and one for Micro Tax III. Micro Tax II, which is packaged separately, handles the actual preparation of the return. Micro Tax III is used only to prepare Schedules C, D, E, SE and form 2119.

To assist you in preparing your return, Aardvark provides a "Tax Organizer" questionnaire. Using the questionnaire is a requirement because the screen display provides almost no prompting during the data entry phase. All that is printed is a curt heading—Line # and Data. The package also includes an abbreviated version of the questionnaire. This form should be used as a worksheet when assembling data for tax return preparation. I recommend that you make several copies. In this way the abbreviated questionnaire can be used over and over again.

Data is entered through an INPUT statement. Since two quantities must be entered, line number and data, premature hitting of the enter key causes a double question mark to appear and data has to be reentered.

Considerable Code

The lack of screen prompts is quickly explained by listing the program. Almost 16K of code is required for the data entry program. Any bright ideas that I might have had re-

garding modifications quickly evaporated. If there are any bugs, I am glad that I didn't find them during the program execution.

Once all tax data has been typed, entering 999,0 puts the program automatically in the edit mode. There appears to be a rather substantial diagnostic edit. It's not fancy, but it works quite well.

Now comes the best part. When you are satisfied that all data is entered just select "calculate" and sit back. The computer does all the work. It even selects the best tax table or method of calculation to use. If, at the end of the calculation phase you find that you have left something out or made an erroneous entry,

*"The computer does
all the work. It even
selects the best
tax table"*

you can make a correction anywhere.

Selecting the calculation mode displays the new tax almost instantly. What a pleasure. Now, after a hard day assembling tax data and calculating the tax due, you don't have to start screaming, when you locate the one small detail that you have left out. Just make the change and presto, a new return.

After the calculations are completed, the data accumulated must be saved on tape. This is for the facsimile schedule program that formats the data on the CRT for manual entry on the tax return. This method of presentation is a real time saver in getting the numbers on the right lines of the return. The program thoughtfully repeats numbers where they should be repeated and offsets numbers where they should be offset. A more advanced version of the same program is available that prints the data on actual tax forms.

Software Check

At the conclusion of the tax return preparation process, I carefully rechecked all figures. New software should always be double-checked. If a mistake is made, you won't be able to blame the machine. It is also doubly important where tax liability is defined by the machine. Fortunately I found no errors.

As indicated earlier, the Micro Tax III program is not required in all instances, however I did have an opportunity to use it for one return. Data is entered, checked for errors or inconsistencies and calculations performed. A facsimile schedule is displayed on the CRT, while you copy it onto your return.

Unlike Micro Tax II, there are some minor bugs which have to be corrected, but these didn't affect the schedule calculations.

All Micro Tax programs are extremely long. If your tape recorder is not in good condition you may have tape loading problems. It pays to persevere, however.

Once loaded the results are worth the effort. I consider the Micro Tax programs a worthwhile addition to any program library.

.....

In the first issue of 80 Microcomputing I discussed some of the limitations of the Model One for accounting record-keeping. High on the list of operating problems is limited disk storage. Several readers have called me to task for this opinion. They indicated that there are many alternatives to the Radio Shack drives for the Model One system. They are right, of course, there are alternatives to the 35 track standard drives.

All of these alternatives involve the use of plug compatible substitutes. Personally, I hesitate to endorse non Radio Shack Products on the Model One. If a problem develops, finding it and then repairing it under warranty can be difficult. However, if you are technically inclined and have the equipment to diagnose computer problems you are probably safe in getting any one of the larger and faster drives. ■

DELAY

About 12,500 of you are probably wondering where your copy of 80 Programs has got to. So many readers signed up as Charter Subscribers, that we have had to reprint the book. The original 20,000 were snapped up at an incredible rate.

The corrections on page 21 are included in the second edition, and you can expect to receive a copy in April. Thank you for your patience and understanding. Please note that the premium offer expired February 29th, 1980.

.....

Due to circumstances beyond our control, we have been forced to delay publication of the Pencil v Scripsit article mentioned in the March Preview. It is now scheduled for the May issue.

Instant Software: BASIC Sophistication

Every once in a while you come across a piece of software that makes you stop and say to yourself, "That's the way it's supposed to be done." This quintet of packages is just that kind of elegant and efficient software.

On this page, we feature: an Energy Audit package for homeowners and the Accounts Receivable/Accounts Payable system. Both of these TRS-80 programs feature the speed and convenience of floppy disks.

On the next page, three cassette-based packages: our Music Master—for those interested in computer music and our two Utility packages. Whichever you may choose, our attention to detail and dedication to producing user-oriented programs means you'll always be satisfied with ISI.

ENERGY AUDIT

When it comes to spending money for energy to heat a home, everybody's a "skinflint." With today's rising fuel prices and staggering inflation, you need ways not only to cut down on your home heating bills but also to conserve our diminishing energy supplies.

One of the best ways to invest your money is to insulate your home. You'll save money, and your home will appreciate in value. But, you're asking yourself, "How do I start, where should I insulate, and what will it cost me?" The Energy Audit package can answer all these questions and more.

The programs in this package will give you detailed instructions on how to examine your home, collect information on its structural components and layout, and create a data file. The program will then analyze this data, show where you're losing money because of excessive heat loss, and describe the most cost-effective methods for saving energy and money.

You may select any area of your home for detailed scrutiny, input your own cost figures, calculate savings potentials for different options, and incorporate whichever you want into your own home-investment budget. In effect, you can create a computerized "model" of your home. You'll be able to see the changes that will be made in your energy budget as a result of adding a wood stove or refinishing an attic.

When your friends and neighbors see how much money you're saving, they will want their homes analyzed too. You could even start your own business, showing your customers exactly where and how to insulate their homes for maximum savings. The Energy Audit package is the perfect selling tool for any contractor or building supplies dealer.

With the Energy Audit package you'll know what your home needs, where it needs it, and how much it will cost you.

Or maybe you enjoy paying utility bills?

Pkg. 0089R (cassette version) \$49.95.

Pkg. 0052RD (disk-based version) \$75.00.

AVAILABLE ON
FLOPPY
DISKS

ACCOUNTS RECEIVABLE/ ACCOUNTS PAYABLE

Now, in one package, you can have a *complete* Accounts Receivable/Accounts Payable (AR/AP) system! These programs will handle all the drudgery involved in processing AR/AP entries.

Each program is capable of handling up to 760 accounts and as many as 1500 entries per month. Should you need to handle more accounts, you can divide them into as many sub-groups as necessary and keep a set of data disks for each sub-group.

The Accounts Receivable program can print invoices, statements, and address labels for each customer. It will also generate a Month End report, a Customer Activity report, and a Daily Sales report.

The Accounts Payable program will generate a Month End report, an Account report, a Daily Activity report and a Check Payment report.

The AR/AP package is ideal for any small business. The programs are self-prompting and are easily used by anyone famil-

iar with AR/AP operations.

These programs can save you money, because they can print your company's letterhead at the top of each invoice and statement, using plain, fan-folded paper.

Accounts Receivable/Accounts Payable: Software for the Professional.

THIS PACKAGE REQUIRES THE FOLLOWING MINIMUM SYSTEM

1. A TRS-80 Level II microcomputer, 16K of memory.
2. An Expansion Interface with at least 16K of additional memory.
3. Three mini-disk drives.
4. A pin-feed line printer.
5. Any TRS-80 Disk Operating System.

Ask for Package 0075RD

\$199.95.

A stylized illustration of musical instruments and notes on a grid background. It includes a piano keyboard, a drum, a guitar, and various musical notes and symbols.

(This package uses an optional audio amplifier, e.g. Radio Shack # 277-1008).
For the TRS-80 Level II 16K. **Order No. 0084R. \$7.95.**

*A trademark of Tandy Corporation

TBS-80 DATA PROCESSING SYSTEMS. ONE STEP BEYOND.

If you thought the TRS-80™ microcomputer was just a toy, think again. These **TBS-80** software systems will turn that computer into a **powerful data processor**.

INFORMATION SYSTEM by Dale Kubler is simply the best in-memory, data base manager on the market. It allows you to create files with up to ten fields per record, up to 40 characters per field and 200 characters total per record. Data from the keyboard is entered directly onto a screen display of one entire file.

Once entered, you can sort or search your entire data base by any category and have the information desired displayed on the screen. **INFORMATION SYSTEM** provides a thorough editing mode allowing changes by line without rewriting an entire file. This program allows you to program your own printouts to almost any form you desire for line or serial printers. Screen prints from anywhere in the program are also available.

INFORMATION SYSTEM creates either disk or cassette files depending upon the version you use. From mail lists to recipes, this program is the ideal small system information manager. The price for this program, 32K up disk is \$34.50. For systems 16K up tape it's \$24.50.

DATA MANAGER by Dale Kubler starts out where **INFORMATION SYSTEM** leaves off. Requiring 32K and one disk, it accepts up to ten user-defined fields with up to forty characters per field and 255 characters per record. As with all TBS software, data entry and editing is professional and simple to use. What makes this program stand apart from "in-mem" data managers is that it uses up to four disks on line as memory, or as much as 320K of memory storage. Because disk sorts take more time than in-mem sorts, **DATA MANAGER** enables the user to create and maintain up to 5 "key" sort files for quick access of data. A utility program is provided to calculate the number of records possible since the amount of records you can maintain is dependent on a number of variables. This program also supports the upper/lower case modification, and printouts can be programmed to almost any format and sent to line or serial printer.

Background printing is provided enabling the computer to search and print at the same time. If you already have **INFORMATION SYSTEM**, **DATA MANAGER** will accept those files. A necessity for organized people, this program sells for \$49.50.

BUSINESS MAIL SYSTEM by Dale Kubler is designed for large-scale business users. Requiring 32K, two disks and printer, this program will store up to 150,000 names in a single file spread out over multiple disks. Each data disk holds 500 names. After data entry, BMS automatically sorts the data by zip code and alphabetical order within the zip code. The program tells you when and which data disk to insert, expanding your files automatically until you've reached 300 disks. Data is input directly onto formatted screen display with the option to use Company Name/Attention instead of Last Name/First Name. Three numeric and one alpha code fields are provided to help you use the search and printout mode. **BUSINESS MAIL SYSTEM** allows you to

™ TRS-80 is a trademark of the Tandy Corporation.



program the number and spacing of your labels. With more features than can be described here, this high-powered program sells for \$125.00.

TEXT MERGE is the program that puts it all together. If you have the **ELECTRIC PENCIL** from Michael Shryer, 32K and one disk drive, then this program is a must. It will merge your data base from any of the above programs with an Electric Pencil file. For example, when you write a letter that is going to several hundred people, you can "code" it by entering a field name from the above programs in place of the actual information. Then, when **TEXT MERGE** is run, it will print out your Pencil file and substitute the "code" with the actual data. In other words, you can print out 1,000 personalized letters without stopping the computer. This program will also enable you to selectively search out only the records from your data base that you wish to use. Also included is the ability to set left, right, top and bottom margins, set page numbers anywhere on the page, and print out right justified if you so choose. **TEXT MERGE** will turn your computer into a powerful data processor and it sells on disk for \$49.50.

TBS has other incredible software for Tandy's microcomputer. Intent on making it a powerful tool, we have **large scale business accounting systems, general accounting systems, system utilities** and the **Library 100**. We have the only **DISK HEAD CLEANER** (for APPLE too!) and **GRAN MASTER DISKETTES**, the best on the market.

TBS is YOUR COMPANY, and we build systems, not just software. The above products are available now, nationwide. Visit your local Computer Dealer or Associate Radio Shack Store and demand the best, demand TBS. For more information, contact us through the numbers below.

TBS™ THE BOTTOM SHELF, INC.
(404) 939-6031 • P.O. Box 49014 • Atlanta, GA 30359

80 REVIEWS

"They usually decide to call Perry or Brown three hours and 500 lines into a program listing, wondering where the rest of line 7000 is."

80 Programs for the TRS-80
Edited by Jim Perry and Chris Brown
1001001 Publishing
Peterborough, NH 03458
paperback

The phone rings once, twice, insistently, still audible, though buried, under a pile of old press releases and author queries. Editor peers at editor over strewn piles of empty envelopes and styrofoam coffee cups littering their office floor.

"You take this one."

"No way, Jose."

A brief moment, and both bolt for the door. Perry is quicker this time; Brown takes the call. Yet another problem is recorded with a listing in *80 Programs for the TRS-80*.

Since the mailing of 20,000 editions of the free book in late December, co-editors Perry and Brown have been racing for their office door with increasing speed and dexterity. You

see, *80 Programs for the TRS-80* has a few problems.

Nothing really serious, mind you, just some programs that don't work very well. Jim Perry light-heartedly says, "Geez, out of 80 programs you're bound to have a few turkeys, aren't you? After all, the price was right."

The readers have had more trouble maintaining a sense of humor about the situation. They usually decide to call Perry or Brown three hours and 500 lines into a program listing, wondering where the rest of line 7000 is.

The book's first printing of twenty thousand copies was given away as a subscription incentive by *80 Microcomputing* magazine. The book contains 80, Level II, BASIC programs of varying complexity in eight broad subject categories. Programming techniques range from crude to sophisticated depending on the author's acumen in BASIC. Program lengths run from the reasonable to the outrageous (the longest being seven pages of microscopic type in length). Blurbs at the beginning of each pro-

gram reveal what the program purportedly does and, in some cases, give instructions for use (noteable exceptions are Ohare and Invisible Maze).

Most of the programs were pilfered from the files of Instant Software (a sister company of 1001001 Publishing, owners of *80 Microcomputing*). Eventually, most will be available on cassette from ISI in updated versions.

Perry, a former projects editor with *Hobby Electronics* and *Electronics Today International*, is a British transplant living and working in the U.S. in an attempt to beat the Queen out of her percentage of his gross. Brown is a self-described Luddite, who found his way into the publishing business by way of technical writing and an affection for high visibility positions—he's an avid mountain climber.

Prepared through the latter part of 1979 by one cockney and one cliff-dweller, the book reflects the seasonal cheer that impairs an editor's ability to detect syntax errors and CMD E messages that appear with regularity when certain programs are run.

These problems are dismissed as trivial by Brown who claims that any *80* subscriber worth his RAM should be able to dig in and correct them "while half in the bag."

He hedges however, trying to explain why the program titled Music Interval Test is, in actuality, the second appearance of the PRINT program authored by co-editor Perry. "Ah, I think we laid out that page the day of our Christmas party."

In fairness to the editors, and their edition, *80 Programs* is generally successful. Many of the programs are quite good and the majority run smoothly. The attitude of one irate subscriber who phoned Perry to inform him that *80 Programs* was worth every penny he paid for it, is somewhat unfair.

Revisions will be made before the next printing. However, what about the twenty thousand copies currently in use?

In an effort to appease subscribers (and stem the flow of phone calls) the editors have agreed to make available all the program corrections they have to date. Listed opposite are the corrected lines and instruction sets for some of the more notorious bombers included in the *80* collection.

The editors suggest that you cut them out and stick them in your book. Future corrections will be printed in this section. Corrections are also available from the editors, c/o *80 Microcomputing*, Peterborough, NH 03458. Please enclose an SASE. They ask that readers not call, however. Those dashes through the styrofoam cups are getting increasingly perilous with each ring. ■

The Individual Study Center
TYC Software
Geneseo, NY
\$39.95
Subject Tapes: \$4.95

by Emily A. Gibbs

If you're a fan of familial carnage with a side order of cooked dog, don't miss "House on Fire," one of the activities in TYC's (Teach Yourself by Computer) Individual Study Center.

"House on Fire" is a graphic quiz designed to reinforce each correct answer with a ladder rung. This ladder saves three graphic lovelies—Tim, Sue and Pup—from some elementary graphic flames, but, because of a bug in the demonstration "sampler" that *80 Microcomputing* looked at, Tim, Sue and Pup are destined to burn every time.

Faulty German

Faulty German translations for "The glass is full" and "He is learning German" seal the fate of the duo and their pet.

Designed for children and adults, the Individual Study Center requires a TRS-80 Level II with 16K.

TYC states that the course encourages "users to teach themselves using the computer and to improve their skills in the subject areas of their

choice." Subject tapes include American History (four different time periods), Geography, Mathematics, Arithmetic (with an emphasis on addition, subtraction, multiplication and division), World History, Languages and Spelling. The fields of study are broken down into different levels of aptitude.

The Individual Study Center includes four cassette tapes, two of which contain six graphic activity programs, the demonstration tape, a blank cassette with a maintenance program for making your own subject tapes and a user's manual. The vinyl binder for storing the cassettes costs an extra \$6.00. Each additional subject data tape costs \$4.95.

The demonstration tape in the package is a "random sampling" of questions included on other subject data tapes produced by TYC Software and the questions are also aimed at different skill levels.

TYC says that each of its subject tapes "contains at least 80 questions and answers," and that may be true, but on the demonstration tape there are only 40 questions and 40 answers. If you're in TYC's documentation department, maybe that does add up to 80, but it computes with us about as well as TYC's German for "The glass is full."

X-Rated

The six activities in TYC's package are "House on Fire," "Around the Ball Park,"
Continue to page 23

MUSIC INTERVALS TEST P.31

```

30 RANDOM: CLEAR 450
35 DIM NO(2), RR(20), SS(20), Z$(20), N$(30)
40 DATA C,1,D,1,E,F,1,G,1,A,1,B,PP,-2,M2,-3,M3,P4,TT,P5,-6
50 DATA M6,-7,M7
60 REM MENU
65 K=0:CLS
70 PRINT"HI! I'M TRS-80." :K=K+1:PRINT:PRINT
80 INPUT"WHAT'S YOUR FIRST NAME";F$:IF F$="LIST" THEN 600
90 INPUT"WHAT'S YOUR LAST NAME";L$:CLS
100 PRINT"THIS PROGRAM WILL GENERATE TWO NOTES BETWEEN A PRIME AND A "
110 PRINT"MAJOR 7. ONLY THE FOLLOWING COMMANDS TO THE QUESTION: 'ARE'"
120 PRINT"YOU READY FOR AN INTERVAL?' ARE VALID."
130 PRINT"ENTER KEY", "GENERATES IN INTERVAL"
140 PRINT"SCORE", "GIVES YOUR CURRENT SCORE"
150 PRINT"STOP", "TYPE STOP TO END THE QUIZ"
160 PRINT"THE FOLLOWING INTERVALS ARE ALLOWED. PP, -2, M2, ETC.;"
170 PRINT"P4, P5, TT. YOU MAY NOT ANSWER AUGMENTED OR DIMINISHED."
180 PRINT"HAVE AT IT, 'F$'."
185 REM MAIN PROGRAM
190 R=0:S=0:PRINT
200 A$="":PRINT:INPUT"ARE YOU READY FOR AN INTERVAL?
(ENTER KEY,SCORE, STOP)";A$
210 IF A$="" THEN 250
220 IF A$="SCORE" THEN 470
230 IF A$="STOP" THEN 550
240 PRINT"PLEASE HIT ENTER OR ANSWER SCORE OR STOP.":GOTO 200
250 FOR I=1 TO 2
260 LET X=RND(12):IF (X=2)OR(X=4)THEN 260
270 IF (X=7)OR(X=9) THEN 260
280 IF X=11 THEN 260
290 NO(I)=X:NEXT I
300 FOR I=1 TO 12: READ N$(I):NEXT I
310 RESTORE
320 R=R+1:CLS
330 PRINT @ 384, N$(NO(1))" TO "N$(NO(2))" IS A:";
340 IF NO(1)<NO(2) THEN 360
350 NO(2)=NO(2)+12
360 D=NO(2)-NO(1)
370 FOR I=1 TO 24:READ N$(I):NEXT I:RESTORE
380 T=0
390 INPUT A$
400 T=T+1
410 IF A$=N$(D+13) THEN 450
415 IF T=2 THEN 440
420 PRINT@440,"NO, TRY AGAIN":GOTO 390
440 PRINT@ 640,"WRONG, IT'S A "N$(D+13):GOTO 200
450 PRINT@ 640,"RIGHT":S=S+1:GOTO 200
460 END
465 REM FOR SCORE
470 CLS
480 P=S/R*100
490 PRINT"YOUR SCORE IS: "S "OUT OF"R "FOR "INT(P) "%"
500 IF INT(P)>90 THEN 530
510 IF INT(P)>80 THEN 540
520 PRINT"NOT TOO GOOD "F$" "LS", YOU NEED MORE PRACTICE.":
GOTO 200
530 PRINT"VERY GOOD "F$". MAYBE YOU'RE READY FOR INTERVAL II.":
GOTO 200
540 PRINT"JUST FAIR "F$", YOU COULD DO BETTER.":GOTO 200
545 REM STOP AND LOAD LISTS
550 LET Z$(K)=L$+"", "+F$
560 LET RR(K)=R:LET SS(K)=S
570 CLS:PRINT"SEE YOU LATER, "F$". DON'T WRITE TOO MANY NOTES."
580 FOR I=1 TO 2500:NEXT I
590 CLS:GOTO 70
595 REM PRINT TEACHER'S LIST
600 PRINT"NAME";TAB(30)"# RUN";TAB(38)"# RIGHT";TAB(49)"%":PRINT
605 K=K+1:J=0
610 FOR I=1 TO K
620 LET P=SS(I)/RR(I)*100:J=J+1
630 PRINTZ$(I);TAB(31)RR(I);TAB(39)SS(I);TAB(48)INT(P)
640 IF J<10 THEN 670
650 FOR H=1 TO 5000:NEXT H
660 J=0
670 NEXT I
680 GOTO 70
690 END

```

BATTLESHIP P.97

```

595 PRINTTAB(30)CHR$(IL+64)TAB(34);:FORIC=1TO10:PRINTC$(IL,IC);:
PRINT" ";:NEXTIC:PRINTCHR$(26)CHR$(29);:NEXTIL:PRINTCHR$(31):RET
URN

```

POWER SUPPLY DESIGN P.139

```

4500 IF C1<6 THEN C1=6 ELSE IF C1<=10 AND C1>6 THEN C1=10 ELSE IF C1<=12 AND C1>10 TH
ENC1=12 ELSE IF C1<=15 AND C1>12 THEN C1=15 ELSE IF C1<=20 AND C1>15 THEN C1=20
ELSE IF C1<=25 AND C1>15 THEN C1=25 ELSE IF C1<=30 AND C1>25 THEN C1=30 ELSE IF C
1<=35 AND C1>25 THEN C1=35

```

DUE TO OUR PRINTING THIMBLE, A "[" REPRESENTS AN UP ARROW
AND INDICATES EXPONENTATION IN A PROGRAM LISTING.

OHARE INSTRUCTION SET P.105

EACH 'AIRCRAFT' RADAR RETURN---
IS LABELED WITH ITS FLIGHT DESIGNATOR LETTER--
AND ITS CURRENT COMPASS HEADING.

A 135

AH135S180

COMMAND CONTACT WITH EACH AIRCRAFT IS ESTABLISHED
BY TYPING 'C' FOLLOWED BY THE SELECTED AIRCRAFT
FLIGHT DESIGNATOR-(A SINGLE LETTER)---E.G. 'CA'.

COMMAND ACKNOWLEDGEMENT RESULTS IN APPEARANCE OF AIR-
CRAFT 'A' FLIGHT DATA IN TOP LEFT PORTION OF DISPLAY
INDICATING AIRCRAFT HEADING 'H135' AND SPEED 'S180'.

AIRCRAFT 'A' WILL NOW RESPOND TO SPEED AND HEADING
COMMANDS. NOTE THAT THREE DIGITS ARE REQUIRED FOR
EACH SPEED OR TURN COMMAND. FOR A LEFT TURN
TO A COMPASS HEADING OF 90 DEGREES, TYPE L090.
COMMAND IS NOT EXECUTED UNTIL THIRD DIGIT IS TYPED.

'STROBE LIGHTS' WILL OPERATE ON THE ONLY RUNWAY ON
WHICH LANDINGS ARE PERMITTED.--BE CAREFUL!--RUN-
WAY SELECTION WILL UPDATE AT TEN MINUTE INTERVALS.
A 'WIND CHANGE' WARNING WILL BE ISSUED AT EACH UPDATE.

ALL 'AIRCRAFT' MUST BE PRECISELY ALIGNED WITH RUN-
WAY AT TIME OF TOUCH DOWN. SPEED MUST BE SET TO
BETWEEN 120 AND 150 KNOTS-----CRASH OR ABORT WILL
OCCUR OTHERWISE.

REAL ESTATE ANALYSIS P.45

```

6300 D1=D(1)
6310 GOTO6050
7000 'SUBROUTINE TO CALC THE INTERNAL RATE OF RETURN
7010 IF(-Y+SC+GP(Q))>0 THEN7050ELSE7260
7050 FOR RR=0 TO 5 STEP .01
7060 GOSUB 7200
7070 IF (-FV+K+GP(Q))>0 THEN7080
7074 YD(Q)=RR
7076 RETURN
7080 NEXT RR
7090 PRINT"RATE OF RETURN > 500%."
YIELD ARBITRARILY SET AT500%."
7100 YD(Q)=5
7110 RETURN
7200 K=0:FV=Y*(1+RR)[N
7210 FOR J =1 TO N
7220 SD(J)=SC(J)*(1+RR)[(N-J)
7230 K=K+SD(J)
7240 NEXT J
7250 RETURN
7260 FOR RR=0TO-5STEP-.01
7270 GOSUB 7200
7280 IF(-FV+K+GP(Q))<0 THEN 7310
7290 YD(Q)=RR
7300 RETURN
7310 NEXT RR
7320 PRINT"RATE OF RETURN < -500%."
YIELD ARBITRARILY SET AT -500%."
7330 YD(Q)=-5
7340 RETURN

```

ANTENNA SYSTEM DESIGN P. 133

6070 LD=L2-L1

OSCAR SATELLITE LOCATOR P. 126

2360 TM=TM+2:GOTO 2240

CALENDAR P. 231

```

1530 PRINT"NOT A VALID DATE. ";:GOTO 340
1540 END

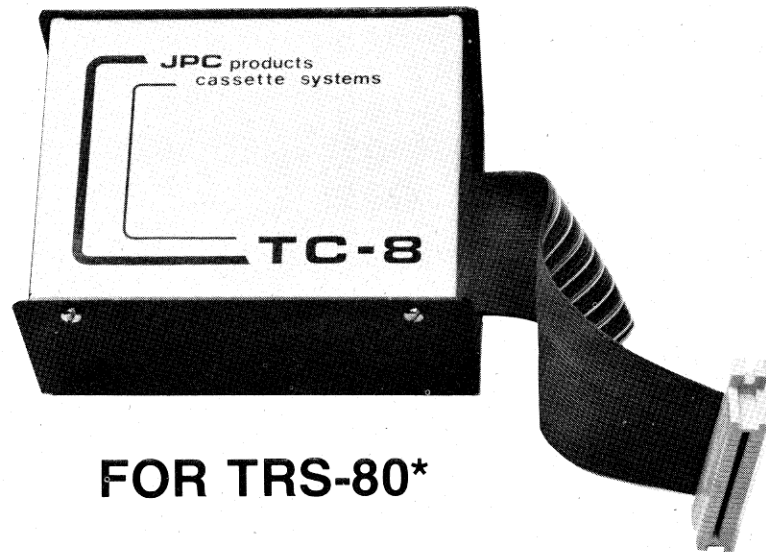
```

80 Programs for the TRS-80

Please see 'Delay' on page 16

Poor Man's Floppy

HIGH SPEED CASSETTE SYSTEM



Now the widely acclaimed JPC Cassette System is available for your TRS-80* computer. The price is only \$69.95.

FOR TRS-80*

The TRS-80* is undoubtedly one of the best small computers around. But its cassette recording system can be very frustrating, particularly if you can't read an important cassette. And getting the volume control set just right is really a pain. Waiting 45 seconds to load "Blackjack" is no fun either.

JPC Products Company has developed an improved cassette system that uses your present cassette recorder but loads programs 5 TIMES faster, with much better reliability.

The original JPC cassette interface is the TC-3, which was developed 2 years ago for the M6800 computers. It has been very successful, as you can see from the magazine and owner comments below. Now we have a similar unit for the TRS-80*. At \$69.95 plus shipping the TC-8 is a real value.

PAISED IN REVIEWS

"The JPC Products Model TC-3 cassette interface provides a VERY RELIABLE means of saving programs and data to tape . . . both fast and reliable. The TC-3 is very convenient to use. The hardware is excellent . . . The TC-3 is rated AAA because it is an excellent low cost alternative to a floppy disk system for the person on a tight budget."

*Product Review
68' Micro Journal
June 1979*

OWNERS LOVE IT

"I love your interface. I have recommended it to all."

D.O. (Florida)

"Excellent! A poor man's floppy. Thanks."

F.B. (Quebec)

"It is great. I can't believe it's so fast."

E.T. (Arkansas)

"Great! Fast! Reliable! Worked first time!"

C.Z. (New York)

"It is the answer to my prayers!"

S.S. (New York)

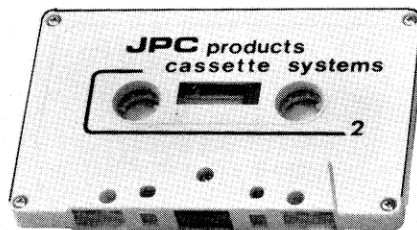
"The best through-the-mail device I have ever purchased."

J.P. (Florida)

"I'm glad I bought this kit. Worked first time. Never one bad load." *R.M. (New York)*

"The first kit I have ever built that worked the first time without any adjustment or trouble-shooting."

F.L. (Colorado)



INEXPENSIVE MEDIA

The TC-8 and your present cassette recorder will allow you to store 50,000 Bytes on a standard 10 minute cassette. Or 300,000 Bytes on a standard 60 minute cassette. At a cost of \$1 to \$3. Our C-10 data cassettes sell for \$1.39 with a money-back guarantee.

PLUG IT IN

The TC-8 plugs into the expansion connector on the back of the keyboard and does its thing 5 TIMES FASTER! Less than ONE BAD LOAD in a MILLION BYTES! With the VOLUME CONTROL ANYWHERE BETWEEN 1 AND 8.

If you prefer you can leave the existing recorder connected normally and add a second one for the TC-8.

THERE'S A CATCH

The TC-8 magic is mostly done in software. So you have to load a small program into the upper seven hundred bytes of memory. It is usually out of the way there. We provide the software on a cassette that comes with the TC-8. Just load it in.

*TRADEMARK OF TANDY CORPORATION

YOU CAN BUILD IT

The TC-8 is available as a kit for \$69.95 plus shipping. It is very easy to build. It should only take you an hour or so. Even if you have never built a kit before, you can build the TC-8.

If you can get toothpaste on a toothbrush, you can learn to solder. Our instruction manual will show you how.

"CAN'T FAIL" GUARANTEE

If you build the TC-8 and for any reason it doesn't work, we will make it work at NO COST. All you have to pay is the shipping. We guarantee it.

WE WILL BUILD IT

The TC-8 is available fully assembled for \$99.95 plus shipping. We ship assembled units 3 weeks after we receive your order. But truthfully, with our "CAN'T FAIL" guarantee, we don't understand why you wouldn't rather do it yourself.

ORDER NOW

To order your TC-8 kit, send your check or money order for \$69.95 plus \$3.50 postage and handling to JPC PRODUCTS CO., 12021 Paisano Ct., Albuquerque, NM 87112 (New Mexico residents add 4% sales tax). Credit card orders accepted by phone or mail. Personal checks will delay shipment. We will otherwise immediately ship you the TC-8 kit, the cabinet, the ribbon cable, the power adapter, an instruction manual, and a cassette containing the software.

At the present time, the only version of the TC-8 available is for 16K LEVEL II SYSTEMS.



✓ 190

JPC PRODUCTS CO.

Phone (505) 294-4623

12021 Paisano Ct.

Albuquerque, N.M. 87112

80 REVIEWS

From page 20

"Puzzler," Matching," "Beat the Clock" and "Completion". Although these nomenclatures sound like vignettes from an X-rated movie, remember that the activities are for children, as well as adults. Correct answers, which follow immediately or at the end of each activity, positively reinforce the learner.

If you buy this software, be prepared to purchase more than one data tape or be willing to make your own with the maintenance program. Even though there are six game programs, using the original equipment data tape for all of them is tedious, since the questions and answers are always the same.

Though the demonstration tape that comes with the package is not a facsimile of TYC's study tapes, the questions requiring bilingual aptitude seem difficult at the adult level, let alone a young child's. No doubt the subject data tapes for different skill levels would be more enlightening. Nevertheless, these questions are probably helpful to someone attempting to learn and practice spelling a foreign language.

"Beat the Clock" drills for speed and accuracy in answering questions. The user chooses from thirteen time lengths in which to respond. This feature gives you plenty of time to type your answer, an essential trait given TRS-80's notorious keybounce. The user then lengthens or shortens the time he needs to answer the questions.

"Puzzler" provides more entertainment than some of the other activities in the TYC package, but it is misleading to call it a crossword puzzle. None of the blocks connect, and numbers, as well as words, appear in the blocks.

Helpful Format

The screen displays the question after the player chooses which group of squares s/he wants to complete first. The help is in the format, since the user knows exactly how many letters or digits there are in the answer. The correct puzzle appears at the end of the game.

In "Completion Drill and Test" the user chooses either to complete the answer for a given question (item) or vice versa. The user sees the correct answers immediately or at the end of the game, depending on his or her preference.

If the player does not give the *exact* syntax for a question or answer, his response is incorrect.

This is unfair, since you would have to possess a photographic memory or spend hours memorizing the exact wording of the test. It is ridiculous to assume that an elementary level student could do as much.

"Around the Ball Park" provides entertainment for all age levels. The interesting graphics make this game fun to play. You watch a baseball player smack the ball into the stands. For each correct answer, the user scores a single, double, triple or homerun, and the player at bat

moves to a base. There are 20 questions on our demo tape and the game continues despite that German translation bug.

The "Matching Drill and Test" is written in a multiple choice format. The player elects to match the correct question with the given answer or vice versa.

The package includes a blank cassette tape and, along with the maintenance program, gives you instructions to modify an old subject data tape or to create a new one. Its only restrictions are on character lengths for an answer and

the total number of questions and answers. For all the activities, a given entry can be no longer than 60 characters or spaces per line.

The price of the Individual Study Center is steep, since only a "random sampling" demonstration tape comes with the package, but, hopefully, other TYC tapes do not have the same bug as the demonstration tape. Overall, the graphics and variety of activity programs in the package make the games fun to play, provided the user has enough data tapes to sustain his or her interest. ■

TSHORT
Web Associates
Monrovia, CA
\$9.95

by John Adams

I suppose that there are people who like to type coded programs into their computers. I am not one of them. I find flowcharting and writing programs mentally stimulating and refreshing.

My typing style is, to put it mildly, individual. I can manage with word text, but an expression such as "560 T\$(L1,5)=MID\$(Q\$,M4,6)" slows me down considerably. Most of my program errors are the result of dumb typing mistakes. That is why finding TSHORT was such a pleasure. It doesn't eliminate entering the program, but it certainly makes it easier.

TSHORT

TSHORT, produced by Web Associates, is an object file which loads into low memory and occupies 562 bytes. It is furnished on a cassette tape with a program for Level II on one side and one for DOS on the other.

TSHORT allows the user to enter 32 BASIC instruction words in a single uppercase keystroke. For example, hitting Q enters "SYSTEM", F enters "LEFT\$(" and P enters "LPRINT". Hitting shift and the space bar puts you in the edit mode.

If you need to BREAK into your program, hitting shift BREAK causes execution to CONTINUE. Decals (white letters on transparent plastic) which can be attached to the affected keys are furnished. All of the letter keys are used, as well as the BREAK, RIGHT ARROW, DOWN ARROW, ENTER, CLEAR and the space bar keys. Using " " for a current line and "?" for PRINT are still permitted.

The UP ARROW, LEFT ARROW and @ keys function normally, as they are not recognized by the program. For units with lowercase, instructions are given to turn TSHORT on and off.

Using the program with DOS is covered in detail, but I only will describe its use in Level II. Arrangement of the decals is logical, and it only takes a half hour or so to get used to their location.

The instructions that can be entered with a single keystroke are listed in Table 1.

Affixing the decals is quite difficult; it took me over an hour. They come on a narrow 1/2 inch strip of plastic which has an adhesive backing. Because the decals must fit on the front of the keys, they are necessarily very small. The letters are about 4/32 of an inch high and there is only 1/32 of an inch of space between them.

It takes a keen eye, a steady hand and a very sharp Exacto knife to separate them. They can then be lifted with the point of the knife and transferred to the front plane of the keys with a pair of tweezers.

The instructions state that meticulous care will produce that "factory installed" look. Though mine do not possess such a look, they are clear and legible.

Once you have affixed the decals, you are ready to load the program. Upon power up, answer the MEMORY SIZE? request with ENTER, unless you wish to reserve high memory space. All SYSTEM files should be loaded first. Put the tape in the cassette player, checking for the correct side and push play. Type SYSTEM, enter the file name TS and press / and ENTER.

The program takes less than 10 seconds to load. When it has loaded the monitor will respond with "TSHORT 1.0 (C) 1979 RON WIRTH", and below that the query "KUSTOM?".

The KUSTOM key allows the user to store

Continue to page 24

SYSTEM	RND(	ELSE	RETURN	THEN	LEN(	USING	INPUT	ASC(
LPRINT	CONT	TAB(	CLOAD?	STRING\$(	GOSUB	DATA	LEFT\$(	GOTO
RIGHT\$(	INKEY\$	KUSTOM	LIST	GOTO 10	CSAVE"A	#1,	STR\$(	CHRS(
VAL(	INT(	NEXT	MID\$(	EDIT				
Additional decals for DOS are:				MKIS(	MKSS(	MKDS(	OPEN"	INSTR(
				FIELD	CLOSE	CVI(	CVS(	CVI(
These decals will replace:				SYSTEM	RND(	ELSE	ASC(	CLOAD?
				DATA	CSAVE"A	#1,	STR\$(	VAL(

Table 1. Single keystroke instructions.

80 REVIEWS

From page 23

any combination of up to 64 characters for use in entering the program. Anything on the keyboard, included shifted entries, may be used in this string except BREAK, which terminates the KUSTOM loading mode.

Thereafter the entire string can be recalled by typing shift K. This is handy for a subroutine or data line that has to be called often, a USR call, constructing a graphics block using CHR\$ or entering a complex math statement that is used several times.

After loading the KUSTOM string, BREAK returns you to BASIC. If you have no use for a KUSTOM string, BREAK is the default. The screen is now cleared, and the READY and prompt sign appear in the upper left corner. If there is a need to change the KUSTOM string you must enter NAME, which returns you to the KUSTOM loading mode.

The program loads consistently from my CRT-41 cassette recorder with a volume level of 5. If you use another machine, you may have to experiment a little. Each program is recorded twice on the cassette.

Options

There are also some options available. For a fee Web will alter the program so that it can be relocated to any point in high memory you specify.

Custom keys and decals are available for a price, but the instructions state that damaged decals will be replaced if you send them in with a list of replacements needed. Complete instructions are given for DOS 2.1, 2.2, NEW-DOS and BASICR and the package comes with a standard warranty. ■

Running Wild—

The Next Industrial Revolution.

Adam Osborne

Osborne/McGraw Hill, Inc.

New York, NY

Paperback, \$3.95, 181 pages

Chris Brown

Running Wild—*The Next Industrial Revolution*, by Adam Osborne is an entertaining and thought-provoking book.

Osborne's background includes a Ph.D in chemistry and experience as an author/publisher of microelectronics texts including *Introduction to Microcomputers* and *8080 Programming for Logic Design*.

His successful publishing operation was recently acquired by McGraw Hill, Inc.

Osborne's book contains both history and conjecture. In his introduction he candidly admits his views are those of a layman. Although approaching futurism from a technological perspective, the author remains skeptical of its benefits.

Osborne's premise is based on a simple dic-

tum of physics which states that any ordered system undergoing change is an unpredictable one. The microelectronic revolution has, he claims, resulted in so many changes in our lifestyles that serious questions of cultural balance are being raised. The theory is not a new one, but Osborne's treatment of it from a microcomputing viewpoint is unique.

The author begins by examining the recent history of technology in general and microelectronics in specific. Spawned in the space program, microminiature components and LSI techniques have, he feels, created a revolution in information management.

Large corporations, such as IBM, have been caught off guard and, unable to respond to the needs of the new science, have relinquished the role of innovator to small, newly established companies.

In addition, a new breed of entrepreneurial gypsy has surfaced to guide these small companies to success. Operating beyond the constraints of corporate loyalty, these new journeymen engineers and designers have become a mobile and unpredictable force in the electronic industry.

Osborne tells some interesting tales of the

birth, growth and, in some cases, death of firms like MITS, Wang, IMSAI, Digital and ITEK. The biographical sketches of their founders are the stuff of American dream stories.

He also makes some interesting predictions: Fully one half of all current blue and white collar jobs will disappear in the next 25 years; most manufacturing jobs will become automated; programming will be taken over by computers; doctors will come to depend on computers for diagnosis and spend less time with patients; computers will totally revolutionize the education industry; telephone and microwave are the growth industries of the future; professional sports will see a large increase in popularity; increased leisure time will force people to deal with vastly different lifestyles.

Will these events take place in the next 25 years? Some are certainly more likely to occur than others. Some are already happening.

Finally though, Osborne's book is worthwhile not because of the accuracy of his analysis, but because his book makes us aware of the social impact of today's innovations on tomorrow's reality. For this reason it is a welcome edition to the nuts and bolts world of microcomputer literature. ■

Introduction to TRS-80 Graphics

Don Inman

dilithium Press,

Portland, Oregon, 1979

132 pages \$8.95

Stephen F. Nowak

Having worked with several types of microcomputer terminals, I find that (except when debugging a program) nothing compares to a CRT. A television terminal is much more alive than a teletypewriter, since the text is in a dynamic state—and with a screen it is possible to utilize graphics.

Some microcomputers, like the TRS-80, offer graphics capabilities that are not as impressive as other manufacturers—but a well understood TRS-80 can draw rings around a more sophisticated unit that is a mystery to its operator. *Introduction to TRS-80 Graphics* makes this in-depth understanding possible.

The author, Don Inman, takes the reader through basic shapes such as rectangles, to the more sophisticated shapes involving curved lines (no mean feat with the TRS-80). The reader not only understands how he produced his designs, but also knows how to modify them as needed.

Also included are sections on bar graphs, animated word graphics and even video games, all of which can be especially useful for teaching programs.

The book is well written and the text laced with examples and exercises. *Graphics* is a dream for the TRS-80 owner, since it is meant to be read with the computer nearby. The examples and illustrations are interesting and usable even in Level I.

Don Inman's efforts have produced a worthwhile text that will be useful as a teaching tool and as a reference. It belongs in the collection of every serious TRS-80 owner.

Air Flight Simulation

Computer Program—

TRS-80 Level I or II

Instant Software

\$7.95

Most computer hobbyists perform many useful duties with their computers, but still enjoy loading in a program just for plain fun. While everybody plays StarTrek in one form or another, you can only enjoy so many rounds of "Klingon approaching." When you reach that point, it's time for a program like *Air Flight Simulation*.

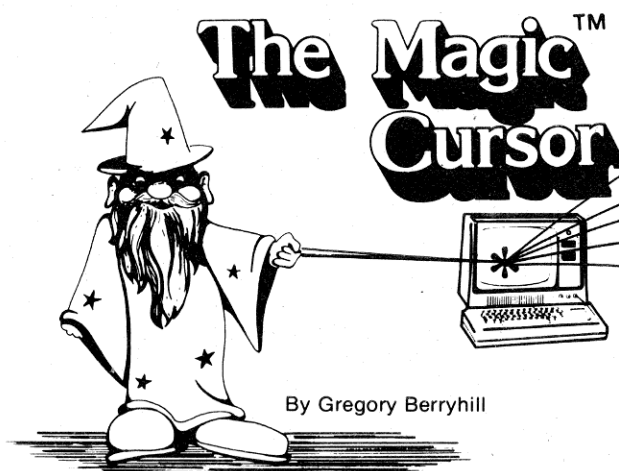
Unlike many programs, this requires a fair amount of thought and I'd advise you to avoid the temptation to run this first and read the directions later. Read the directions first, you'll enjoy it much more.

Simply put, this turns your monitor screen into the control panel of a small aircraft and you must fly the plane completely by instruments. This becomes all the more interesting since you can decide what type of flight plan you are going to follow.

The program monitors altitude, attitude, air speed (including overstressing the engine) and land miles traveled. I found that the more I ran this program, the better I liked it (and I was quite pleased when I was able to complete a few acrobatic maneuvers). I was impressed. This is a program that should be run—not talked about. ■

TRS-80* OWNERS:

- Let the computer write your "Basic" programs for you!
- Draw Pictures, animated figures, data forms!
- Create a library of displays!
- Produce "Commercial" grade software!



By Gregory Berryhill

The **Magic Cursor** is a Revolutionary Family of Products which provides a dramatic new method of reproducing drawings and displays that you create on your screen. It makes both simple displays and complex interactive data input forms. It stores a "Basic Program" on disk (or tape) ready for you to execute alone or as a subroutine. It produces screens in both standard and wide screen.

It is available for any level 2, 16K or larger system with tape or disk. An optional version is now available with output files for assembly language programmers.

Be sure to pick out the system that fits your present needs and order it today. You may upgrade your original copy by paying the difference and a moderate service charge.

MAGIC CURSOR PROGRAMS

THE BABY CURSOR allows you to easily create screens (including graphics) on your video. A powerful command then generates the BASIC instructions to recreate the screen. For the first time, a program for automatic generation of video display forms. (16K Tape or 16K Disk) **\$24.95**

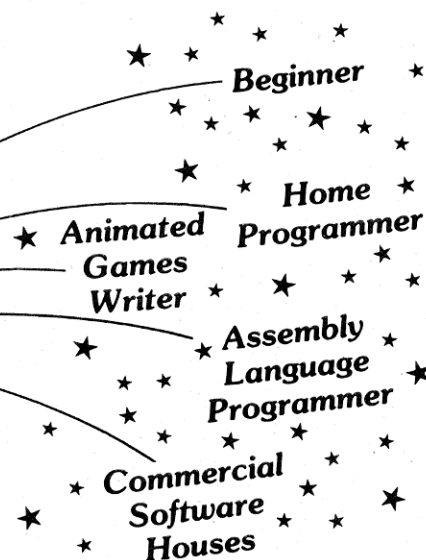
THE MAGIC CURSOR I additionally makes sophisticated Data Entry and Display easy. With Magic Cursor I you define the Data Entry or Display fields directly on your screen. The definition commands generate the BASIC instructions to implement the Data Entry and Display. The Magic Cursor I has commands which move, center and duplicate blocks of graphical or alpha/numeric displays. You can even justify text. (16K Tape Only) **\$79.95**

THE MAGIC CURSOR II adds the power to write animated games easily in BASIC. The Magic Cursor II allows you to reload previous screens either from memory or from Disk. You can then modify them and store either the modified screen or only the changes. (32K Disk Only) **\$99.95**

THE MAGIC CURSOR III will be available soon for the new Model II Computer (32K One or more Disks) **\$149.95**

THE MAGIC CURSOR IV provides the features of Magic Cursor II but has output for the assembly language programmer. (32K Disk Only) **\$99.95**

*Trademark of Radio Shack, a Tandy Co.



OTHER PROGRAMS WRITTEN BY CCC

GENERAL LEDGER, Accounts Payable, Accounts Receivable, etc. - We are an official Osborne Conversion Co.

PROGRAMMER UTILITIES for supporting assembly language programming and Disk modification.

MAGIC MEMORY - personal inventory programs for stamp collection, coin collectors, personal libraries, etc.

WRITE FOR OUR COMPLETE SOFTWARE CATALOG!!

Send Check or Money Order payable to:



**CUSTOM
COMPUTER
CENTER, INC.**

ATTN: Jim Martens
P.O. BOX 58042
HOUSTON, TEXAS 77058
or call: 713/474-2428

Send Check or Money Order payable to:

Send Information ONLY.

8-D / Houston, Texas 77058

QUAN.	DESCRIPTION	PRICE
	Handling Charge: \$1.50	
	Texas Res. add 6%	
	Sales Tax	
	TAX & HANDLING	
	TOTAL	
	MASTER CHARGE / VISA	
	CARD #	
	NAME	
	ADDRESS	
	CITY	
	STATE	
	ZIP	
	EXPIRES	

Call 713 / 334-2991 or order by mail. Master Charge, Visa, Certified Check or Money Order accepted. Personal Checks require 14 days to clear. C.O.D. or collect calls not accepted. Software Guaranteed for replacement only. Prices subject to change without notice. Programs supplied on cassette tape. For disk versions, the cassette supplied will automatically create a disk file.

80 INPUT

“(They) make the plausible but erroneous assertion that the Radio Shack method of data encoding . . . is relatively forgiving of tape speed variations.”

Anadex Update

I read the February 1980 issue of *80 Microcomputing* with great interest, and was pleasantly surprised when I came to the article by Walter June reviewing the Anadex Model DP-8000. Contrary to many product review articles I have read, he obviously had hands on experience with the DP-8000 before writing about it. The article was fair and accurate for the version he had.

For the record, however, I would like to update some of the “negative” points. Printers with serial number AO 2000 and above incorporate additional circuitry to allow a Data Strobe minimum length of 0.5 microseconds (not 2.0 microseconds.) The note, however, was allowed to remain (for reference) in the Operator’s Manual until the October 1979 revision.

Printers with serial number AO 2919 and above (and also a few earlier ones) incorporate a Self Test feature, and, beginning with serial number AO 3094, adjustable width sprockets are incorporated. Black ribbons are now available but have a shorter life expectancy than the purple.

For those users who must be able to line feed through top-of-form, a patch EPROM is available, at a very modest cost, to remove this limitation, allow zero form length, and delete the time-out feature.

Users of the DP-8000 printer having questions or difficulties are welcome to call our application engineers for assistance.

This was my first opportunity to read *80 Microcomputing*, but I will look forward to succeeding issues with pleasure and interest.

Kenneth A. Mathews
Vice-President of Marketing
Anadex, Inc.
Chatsworth, CA

Only Plausible

In their interesting article “Cassette Problems” (January 1980, p. 62), Don Stoner and Dick Barker make the plausible but erroneous assertion that the Radio Shack method of data encoding, with a separate sync pulse for each data bit, is relatively forgiving of tape speed variations. Actually, the opposite is true. Failure to observe the onset time of the data pulse loses information. When one pulse is used for both sync and data, the tolerance limits for variations in speed are roughly doubled.

In fact, sensitivity to variations in tape speed

undoubtedly contributes to the TRS-80 loading problem. The load routines that I’ve examined (in Level I ROM and Level II T-BUG) fail to achieve the theoretically possible tolerance, because they begin looking for the sync pulse too soon and are liable to catch the tail end of the data pulse. This error is more likely when the volume setting is high or the tape speed is low. In other words, the volume setting is more critical when the tape was written on a faster recorder.

If there is a sound reason for the sync pulses, I haven’t been able to fathom it. At most, they are a programming convenience. The TRS-80’s unique combination of low data density and tricky loading is primarily caused by poor software. I routinely record at 1500 bps without any difficulties, by encoding one pulse per bit.

Norman D. Whaland
430 E. 9th St.
New York, NY

Sargon II on Disk

Owners of the new TRS-80 Sargon II chess program tape may be interested to know that there is a simple way to put the program onto disk, requiring no additional software.

First, power-up Level II BASIC by holding down the Break key while you press the Reset button. Load the Sargon II master tape according to its instructions. When the program comes up running, hold down the Break key and push Reset again. Push Enter for Memory Size. Now carefully type in the following one-line BASIC program. Check it, and run it:

```
IFORJ = ITO43:INPUTK:POKE30460 + J,K:  
FORL = ITO80:NEXTL:NEXTJ
```

The program prompts you with ? to enter each of the forty-three decimal numbers listed below. Type them carefully, pushing <Enter> after each complete number:

```
1 253 44 17 0 74 33 0 128 237 176 62 195 50  
12 64 62 0 50 13 64 62 80 50 14 64 195 0 80  
1 26 45 17 25 173 33 25 119 237 184 195 0 0
```

After the last one is entered, the Ready prompt reappears. If you see that you’ve entered a number incorrectly, press Break and run the program again.

Now make sure the disk in the drive has at least 10 grans of free space and no write-protect tab. Still in Level II BASIC, type:

```
SYSTEM <Enter>
```

And at the *? prompt, type:

```
/30490 <Enter>
```

The disk will boot up normally. At “DOS READY”, type:

```
DUMP SARGON2/CMD (START = X’8000’,END =  
X’AD19’,TRA = X’ACFD’)<Enter>
```

When the disk stops running, it will have a copy of Sargon II on it. Push Reset, and at DOS READY type:

```
SARGON2 <Enter>
```

The program should come up ready to play.

Roxton Baker
56 South Road
Ellington, CT

Reserving Memory

I would like to pass the following on to the readers of *80 Microcomputing*.

I enjoyed Roger Pape’s article Music Maestro! very much. My first thought was to put music in some of my games, but the idea of having to remember to reserve memory for the USR routine did not appeal to me. I have had this problem with some of my other software that also uses high memory. I therefore sought a way to reserve enough memory for all of my routines upon power-up.

Since I have a disk, I was in luck. Disk BASIC and TRSDOS use the locations 4049H–404AH to keep track of the top of usable memory. By putting in the values that I want for the top of memory before entering Disk BASIC, I can answer the MEMORY SIZE? question with <ENTER>.

```
10 CLS:INPUT“MEMSIZE IN DECIMAL”:,M  
20 MSB = INT(M/256):LSB = M - MSB*256  
30 FOR X = 29952 TO 29962:READ K:POKE X,K:  
NEXT X  
40 DATA 253,33,0,0,253,34,73,64,205,45,64  
50 POKE &H7502,LSB:POKE &H7503,MSB  
60 PRINT:PRINT“TYPE THE FOLLOWING  
FOR EACH COPY YOU WANT TO SAVE.”  
70 PRINT:PRINT“F RESERVE/CMD:0 7500  
750A 7500 <ENTER>”  
80 CMD“F”,“TAPEDISK”
```

The program in Listing 1 allows you to put a small (11 byte) machine language program on your disks with the help of TAPEDISK. To use the program, load Disk BASIC and answer the MEMORY SIZE? question with 29952. Type in the program and run it. Input the decimal value of where you want the top of memory to be. The program then POKes the machine lan-

guage routine into high memory and exits to TAPEDISK.

Once you save this program on your diskettes, use the TRSDOS AUTO command to allow RESERVE/CMD to execute upon power-up/reset. With this done, you will never have to remember where to set the top of memory.

Nick Moss
108 Via Hermosa
Santa Cruz, CA

Watch That Print

I just wanted to let you know that I have very much enjoyed the first two issues of *80 Microcomputing*. It is nice to have a quality magazine whose content isn't three-fourths about a system we don't have.

I especially wanted to comment on the article, "Listen to your Keyboard". The part on TRS-80 Cassette Recorder modifications was excellent. I did mods 1, 3 and 4. They worked beautifully. The money I saved over buying a commercial interface unit paid for my subscription to your magazine.

One comment on the Feb. issue that probably will apply to future issues unless you are careful is the size of print of some program listings. "Household Accountant" on p. 116 just about disappeared into the microscopic range.

Robert E. Pontius
4703 Cap. Rock Drive
Austin, TX

We're glad that you've enjoyed 80 so far!

We, too, are happy with the magazine but realize that there is always room for improvement.

As for printouts, we are gradually changing to a standard size and format—produced on the 80 editorial Spinwriter. We feel that this will result in much clearer listings.—Eds.

"Gotcha"

Dan Lovy's excellent idea for a Winking Cursor (Jan., p. 68) has a "gotcha" in it which might trip up some of your readers, particularly if the time delays are increased or if the basic idea is put to use for other purposes.

The INKEY\$ function must reset itself after each entry in order to accept a new entry. In Dan's routine, INKEY\$ can only read input data between timing loops at which time it is reset. The only reason that it reads a key entry at all during the timing loops is due to the one key input buffer which holds an input character until it's read. Unfortunately, the buffer cannot accept more than one entry during the wait period and must sit there until the delay loop times out before it can read the current entry and get on with the program. Both of these features are undesirable for touch typists (which is how I discovered them) and becomes intolerable if the timing loops are lengthened.

Fortunately, a couple of simple changes to lines 1010, 1020 & 1030 will correct these problems as shown here:

```
1010 PRINT @ PO, CHR$(95); FOR WAIT=1 TO 35 :  
    INS=INKEYS : IF INS<>" " THEN 1040  
1020 NEXT  
1030 FOR WAIT=1 TO 35 : INS=INKEYS : IF INS=" "  
    THEN PRINT @ PO, " "; NEXT : GOTO 1010
```

Dan's concept allows complete flexibility in formatting and, better yet, it allows input statements without the ugly, ever present question mark at the end.

Try this sample program and see how much neater it is than the standard input format.

Dan's "Winking Cursor" should be in everyone's bag of tricks. It sure has a place in mine.

```
10 CLS : PRINT @ 524, "PLEASE TYPE YOUR NAME--";  
    PRINT @ 596, " "; GOSUB 1000  
20 PRINT @ 910, "YOUR NAME IS "; FIS : GOTO 20
```

William H. Eburn, Jr.
506 Dutton Road
Sudbury, MA

80 DEBUG

A Fix for a Fix

Regarding my article printed in your January issue of *80 Microcomputing*, "Cheap CLOAD Fix" p. 132, I've received a couple of calls about it not working on some equipment.

You may want to pass this on to some of your readers in a future issue. If the modification doesn't work as is, add a 33 to 50 ohm resistor in series with the recorder output (computer input) jack. This should correct most of the problems.

Scott D. King
7905 59th Ave. N.
New Hope, MN

Babybug Revisited

I'd like to point out an error in the program listing on page 48 of my article Babybug I in the February issue of *80 Microcomputing*.

Line 10 should read:

```
10 Q=Q+1:PRINTCHR$(27);CHR$(30);  
    K=K+1:IFK<256GOTO102
```

Dennis Bathory Kitz
Roxbury, VT

Household Update

In your February issue, I found what I believe to be an error in the "Household Accountant" article.

The program on page 116, line 565 should read:

```
565 IF S=2 THEN 900 (not 500)
```

I hope!

J. T. McGirr
Pres. Seaway Chemical, Inc.
7005 Mill Road
Brecksville, OH

Subscript Era

I was pleased to see my music article in the inaugural issue of *80 Microcomputing*; although at this point it may appear to many as being slightly outdated. The article was submitted to Kilobaud in December 1978, a full year before being published (before Micro Music or any other sound generation software was available). The intent of the article was to indicate the ease with which sound could be generated and encourage others to develop software with sound. Since that time numerous programs with sound have appeared. However, considering the number of comments received, the article appears to have still served its purpose.

For those who may have encountered problems getting the music routines to work properly, the only error in the listings was a subscript error in line 100 of Figure 3. The correct statement should be:

```
100 READ K:IF K>0 X=USR(N%(K)):GOTO 100
```

Those machines having the DATA RESTORE problem should obviously include a POKE 16553,255 at the beginning of any BASIC program with READ statements.

When attempting to run the program, an FC error message, a jump to the MEMORY SIZE? dialog, or any other strange behavior indicates a bad value in one of the DATA statements. Check each number carefully. (A zero with a slash through it can easily be confused with an eight, etc.) Incidentally, if the MEMORY SIZE question is encountered, be sure to push the reset button behind the keyboard immediately to avoid losing the source statements.

Roger L. Pape
7545 Marble Dr.
Liverpool, NY

TRS-80 Expo '80

What is being billed by Radio Shack as "the business and educational computer show of the decade," will be brought to more than 50 cities, primarily major market areas, by the nationwide chain.

Expo '80, according to Radio Shack, is designed to acquaint small businessmen, educators and professional people with the value of modern computer technology, and to demonstrate Radio Shack's line of TRS-80 microcomputer systems.

Visitors to the exhibit will be able to see a multi-media presentation and participate in a "hands-on" demonstration.

Radio Shack computer experts will be on hand to answer questions and demonstrate new software programs including: Educators Math K-8, Word Processing, Standard & Poor's "Stockpak" Stock Selection System and Portfolio Management System, Business Inventory, Business Accounts Receivable, and various personal applications.

A TRS-80 Model I 4K Level I Microcomputer System will be given away at the Expo. All those attending will receive a certificate good for a free computer language course at any Radio Shack Computer Center.

Invaders

A new arcade game, Invaders, is available for the TRS-80 Level II 16K from LEVEL IV Products, Inc., Livonia, MI. The user must defend the earth against the aliens who are marching down across the screen dropping bombs.

The program, written in machine language, comes complete with sound effects. At the end of each game, it displays the current score, previous score, highest score (or new high score), hits, shots and misses.

The cost is \$14.95 for cassette and \$19.95 for disk.

Reader Service ✓ 162.

Real-Time Analyzer

The real-time audio spectrum analyzer, introduced by Eventide, New York, NY, for the Commodore PET computer, is now available for both the Radio Shack TRS-80 and Apple computers.

The VTU02 (for the TRS-80) divides the audio spectrum from 20 Hz to 20 kHz into 31



Real-Time Analyzer from Eventide

third-octave bands, and displays these bands, with their relative amplitudes, on the computer CRT.

It can be used for measuring sound and noise levels, for optimizing the equalization of a hi-fi or public address system, for checking the frequency response of audio components, and for speech and sound pattern recognition (useful for voice control systems).

Data can be stored, and compared with past, future, or other channel information. Programs to access the analyzer are written in BASIC, and three are provided with each unit: Interactive Operation, Minimal Operation and Self Test.

The VTU02 plugs into the TRS-80 expansion port, providing an equivalent port for further expansion.

Reader Service ✓ 163.

Enchanted Island-Plus

Greg Hassett, North Chelmsford, MA, has written two machine-language Adventures for the 16K Level II TRS-80. The first, Enchanted Island-Plus, is a language translation of Enchanted Island, a member of the series of BASIC Adventures.

The second assembly language Adventure is called Mystery Mansion.

This new series features true split-screen scrolling, a blinking graphic cursor, and dual prompting symbols. The computer's responses are instantly displayed.

Using a database technique which does not require on-line interpretation by the main code, the series offers considerable memory for additional game logic.

These adventures are available from Mad Hatter Software.

Reader Service ✓ 164.

Artificial Intelligence

"Eliza," an exercise in simulated intelligence, is now available from Radio Shack, Ft. Worth, TX, for use on their TRS-80 microcomputer.

Eliza allows a computer to analyze conversational English, respond to questions and carry on a "conversation" with the person at the keyboard.

Designed for use with a Level I or Level II Model I 16K TRS-80, the program cassette also includes Talking Eliza, which permits Eliza to "speak" through a TRS-80 Voice Synthesizer.

Eliza is available from Radio Shack for \$14.95.

Stock Tracker

H & H Trading Company, Pleasant Hill, CA has released a new version of its Stock Tracker program. Based in part on Joseph E. Granville's theory of On-Balance-Volume, the program analyzes supply and demand factors on individual securities, stocks, options and commodities, and tells the user when to buy and sell them.

The program includes an automatic escape from the enter-data routine, a 250 percent increase in speed of printouts and screen displays, the inclusion of trading signals on each security's daily history file, three new logic sections to perfect the timing of recommendations, and the ability to warn the user when an intermediate bottom is approaching on a security.

Stock Tracker, including a user's manual, costs \$150. The manual is available separately for just \$15.

Reader Service ✓ 165.

Random File Disk Sort/Merge

A new disk sort/merge system, DSM, is available for both the TRS Mod-I and Mod-II. DSM, a self contained system written in machine language, sorts large multiple diskette files on a minimum one drive Mod-II or two drive Mod-I disk system; rearranges all records, without key files; sorts random files created by BASIC, including sub-records spanning sectors; sorts on one or more fields in ascending or descending order (fields may be character, binary integer or floating point); provides optional output field deletion, rearrangement,

and padding; and saves sort commands for reuse in production applications.

DSM is available from RACET COMPUTES, Orange, CA, for \$75 (Mod-I version) or \$150 (Mod-II version).

Reader Service ✓ 172.

Software Catalog

The TRS-80 Software Source, available from ComputerMat, Lake Havasu, AZ, is a published listing of 5,000 programs for the TRS-80 from over 360 vendors.

Published in the spring, summer and fall, separate listings in the catalog are alphabetized by program title, by vendor, by cassette, by BASIC and by disk.

A one year's subscription sells for \$15 and a single issue for \$6.

Reader Service ✓ 173.

Vehicle Maintenance Software

A new software package, that maintains costs for cars, trucks, boats or airplanes, has been released by Datacomp, Elk Grove Village, IL.

The menu driven programs record fuel use, repairs and other miscellaneous expenses. Average and total costs can be calculated for a selected period for each set of records and a summary program gives the complete cost picture.

The programs require at least 32K and a disk drive. Supplied on a formatted disk, they were written under NEWDOS, but will run under TRSDOS 2.3. An expansion of the MILES/GAL program issued by Datacomp last spring, the cost is \$24.95.

Reader Service ✓ 166.

Mass Memory for Microcomputers

TARZAC Systems, Virginia Beach, VA, announces their new line of five-screw leaderless computer-cassettes. The microcomputer mass memory unit consists of 10 C-12 or 10 C-20 computer cassettes in a storage book.

TARZAC cassettes are unconditionally guaranteed for life. Any malfunctioning cassette can be returned for immediate replacement. The cost is \$17.95 for 10 C-12 cassettes and \$24.95 for 10 C-20 cassettes.

Educational institutions may be eligible for a 20 percent discount.

Reader Service ✓ 167.

Carry-all for 80

A set of attache-style carrying cases for the TRS-80 computer from Computer Case Company, Columbus, OH will hold the keyboard,

the expansion unit and a tape recorder or up to two disk drives in a fully operational configuration. Plug in the power cable, connect the monitor and operate.

The removable lid has storage space for manuals, disks and working papers. The computer and disk drives (or tape recorder) are held in position with security straps and cradled in foam rubber while operating, transporting or in storage.

The cases are constructed of high quality luggage material covered in vinyl with padded handle, lock, furniture protecting pads and steel skids.

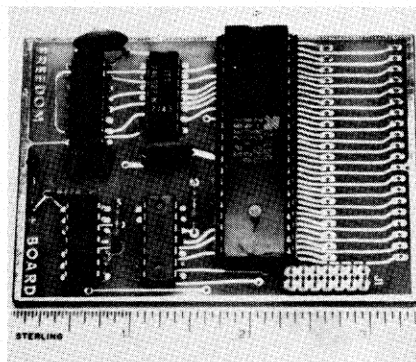
The basic computer case sells for \$109, the monitor case for \$84 and the Line Printer II case for \$89.

Reader Service ✓ 174.

Freedom Changes

The Freedom Option reorganizes TRS-80 memory to emulate a standard Z-80 machine, that responds to conventional CP/M type software, while the Extended Memory adds RAM to the Model 1 machine. It increases the usable memory to 64K.

Both products are from F.E.C., Ltd., Woburn, MA.



Freedom Board from F.E.C., Ltd.

The Freedom Option consists of a circuit board, system disk and instructions. The software (Operating System) converts the TRS-80 to a "real" CP/M type machine, loads programs at Hex 100 and responds to Call 5.

The disk format is changed to a 128 byte, 18 sector IBM format, instead of the 256 byte sector format of the TRS-80. Freedom Mode supports both serial and parallel printers. The Operating System supports both 35 and 40 track disk drives and is compatible with other Z-80 based machines.

The change is pluggable and transparent, while running in TRS-80 mode.

In the Freedom Mode, the ROM is no longer used, and there is room to address 14848 additional bytes. The Extended Memory fills this gap and increases the addressable RAM to a full 64K bytes. This memory is structured to account for the memory mapped areas of the keyboard, screen and I-O functions.

Both changes presume a 48K Disk System for installation. The Freedom Option is priced at \$245 and the Extended Memory is an additional \$295.

Reader Service ✓ 175.

Introduction to Microcomputer Interfacing

A two-week short course on the fundamentals of microcomputer interfacing will be offered by the Virginia Military Institute from July 14 through July 25, 1980. This will be a hands-on laboratory oriented course which will feature the popular TRS-80 microcomputer (Level II with 16K). One microcomputer station for each two participants. Course to be held in the scenic, historic Shenandoah Valley. Reasonable room and meal charges. Camping facilities available. Tuition \$450. Academic credit available. For detailed information contact: Dr. Philip B. Peters, Dept. of Physics, VMI, Lexington, VA 24450. Phone (703)463-6225.

The Keyplus Integrated Utility Package

Keyplus, a collection of utilities enabled directly from the keyboard, is available from SJW, Inc., Huntingdon Valley, PA. Choose from seven different keyboard entry modes: BASIC shorthand (two modes), direct graphic character input (three modes), typewriter style input, and standard TRS-80 keyboard entry.

Keyplus supports auto-repeat, lowercase video (optional hardware modification required), restoration of lost programs, keyboard debounce, single keystroke user definable strings, and more. Routines may be enabled or disabled in just two keystrokes.

The Level II, 16K version is available for \$14.95. A more powerful disk version (32 or 48K) sells for \$19.95.

Reader Service ✓ 168.

The Corvus Cassette

The Corvus Mirror, San Jose, CA, uses a standard video cassette with total capacity of 100 million bytes which, in less than ten minutes, will accept the entire ten-megabytes of data from a Winchester eight-inch hard disk without operator attention.

The Mirror interfaces the data signals on the Corvus disk to a separate customer-supplied video cassette recorder of the VHS, Beta or U-Matic format. If a larger data capacity is required, a reel-to-reel video-tape recorder can be used.

The cost of the Mirror is \$790. A complete system with commercially available video cassette recorder can be assembled for under \$1500.

Reader Service ✓ 171.

I want to thank all of you members of CA for letting me speak here tonight, for letting me unburden my weary soul. You wouldn't think to look at me now that once I trod the straight and narrow . . . well dressed . . . a good job, a nice home and family.

But that was before I met Murray . . .

Barry Kornfeld
190 Waverly Place
New York City, NY 10014

It all started long ago in—let's call it "Anytown, USA."

One evening, as I was walking home from work, I noticed a man furtively beckoning to me from an alley.

"Pssst, hey, kid!" He had the feral eyes of a salesman coming in for the kill. They gleamed hypnotically. Helplessly, I followed his crooked finger into the depths of the alley.

My Eyes Grow Wide

He opened a door, motioned me through, and I found myself in an electronics hobby shop. The man wore a large, yellow badge bearing the words, "Video Nook.

Hello, I'm Murray, the Manager." His finger uncurled and pointed to what looked like a truncated typewriter with a jumble of wire where the carriage should be. The wires led to a plastic TV set and a cheap cassette recorder.

"There it is, kid! Your ticket to paradise!"

"What is it?" I asked, my eyes growing wide.

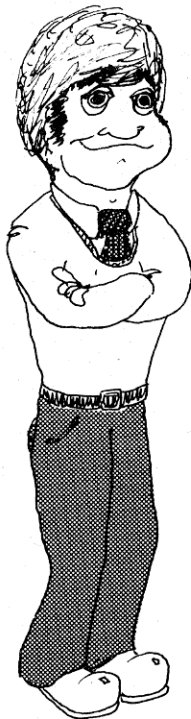
"What is it?" he repeated with feigned amazement.

"Don't you read the papers? Don't you know that you're in the midst of the Personal Computing Revolution? That's our new TRASH 50H* computer!"

"Gee!" I exclaimed, my eyes growing even wider, "A computer! What can you do with it?"

"Not me, kid . . . you! It will add and subtract numbers and store phone numbers and recipes."

"But I can already do that with a calculator, an address



Warning: The Surgeon General

A Confession

book and file cards."

"That's beside the point," he said, edgy with exasperation. "Just think, you'll be part of the computer generation and it's only fourninetyineninetyfivewetake master charge."

"Wow! A whole computer for five hundred bucks. That's awfully cheap."

"Well, how about it, then?" he said, lightly licking his lips. "Shall I wrap one up for you?"

"Gee, I don't know. I've heard some of the guys talking about getting hooked on this stuff and having to buy all sorts of things to support their habit." I pointed to a rack behind the TRASH 50H with all sorts of black and silver boxes bearing thousand dollar price tags.

"Nah!" he said, with a deprecating wave of his arm. "That stuff is only for heavy users!"

"Users?"

"Yeah, that's what we call people who get hooked on computers. But that'll never happen to you. I can tell about these things."

"Gosh, I don't know," I said, scratching my head.

"Come on . . ." said Murray, his eyes on fire, "Don't be a sissy! All the guys do it!"

Helpless again, my charge card hit the counter.

And so, I found myself entering my basement with a large assortment of cardboard boxes. I sneaked in the back way to avoid my wife's inevitable complaint about "another expensive piece of junk to sit in the closet and gather dust!"

My Heart Begins to Flutter

After feverishly zipping open the boxes and plugging the system together, I turned on the power. The monitor lit up with the magic word READY. My heart began to flutter and I felt a barely perceptible, but warm glow spreading through my body. My eyes began devouring the instruction manual as my fingers (two of them, anyway) flew about the keyboard. The minutes grew into hours, and the programs grew longer as the manual demonstrated more and more complicated, ingenious ways to get the video monitor to display, HELLO, MY NAME IS TRASH 50H.

Suddenly, in the middle of a medium-sized program, the keyboard ceased to respond and the screen lit up with, OM ERROR. I feverishly searched the manual and found that TRASH 50H Level 1.1 BASIC has three error messages:

WHAT—meaning I don't know how to do it.

has determined computers can be hazardous to your health.

from a Computer Derelict

HOW—meaning I don't know what you want.

OM—meaning you are out of memory.

Abruptly the warm glow in my body was displaced by a slight ache in my bones. Well, after hunching over that keyboard until 3:30 AM, aches were to be expected, so I took myself to bed, my head still reeling.

Early the next morning I found myself, computer tucked under my arm, hurrying over to Video Nook. On the way I passed a group of young people in Buddhist robes with shaven heads chanting, "OM . . . OM . . ."

"I guess I'm not the only one," I thought as I entered Video Nook.

Murray was nowhere in sight. Another customer was poring over a maze of bubble-packs hanging from the pegboard walls. His eyes had a glassy look. I was about to ask him if he knew where Murray was, when an arm snaked out from behind a pile of speakers and grabbed me.

It was Murray.

"Don't mess with him, kid!

He's into the hard stuff!"

"You mean . . . ?"

"Yeah," he said gravely, "hardware!"

"Listen, Murray, I can't get this thing to do anything but tell me its name and, on top of that, I'm out of memory."

His hand pensively rubbed his chin as he said, almost to himself, "Out of memory already. I didn't think it would happen this fast."

"Look, kid, you can't expect these basic packages to do *everything*. If you want your TRASH 50H to do more, you'll have to go for the 16K RAM and Level 2.1 BASIC. It's only four hundred dollars we take master charge."

"Four hundred bucks!" I shouted. "But the whole computer with video and tape was only five hundred!"

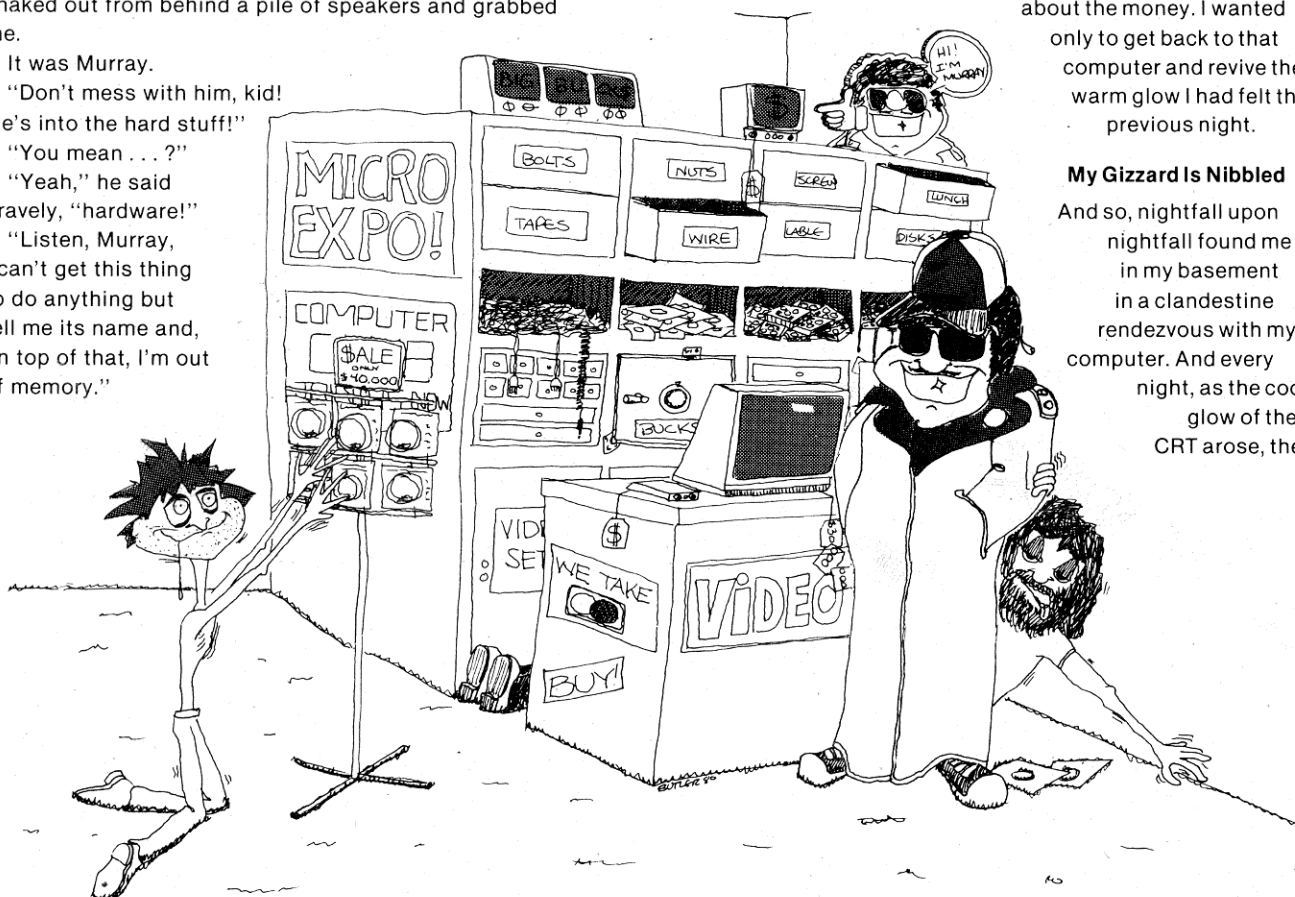
"Look, kid," he said apologetically, "we can't sell everything as a loss leader. We've got to make it up somewhere. After all, we have expenses—rent, payroll, my mother-in-law needs an operation."

"Okay, okay," I said with anger and defeat in my voice, reaching once again for my wallet and the plastic therein.

For, in truth, I no longer cared about the money. I wanted only to get back to that computer and revive the warm glow I had felt the previous night.

My Gizzard Is Nibbled

And so, nightfall upon nightfall found me in my basement in a clandestine rendezvous with my computer. And every night, as the cool glow of the CRT arose, the



warmth suffused my body in greater and more intoxicating magnitudes. The pupils of my eyes diminished to ever smaller pinpoints of rapt concentration on the video display.

Then, one night, I was loading a cassette of the Russian revolution game, TSAR-GONE. The tape had run most of its 15-minute load when my TRASH 50H locked up with a checksum error. A chill began to crawl up my backbone. I readjusted the cassette recorder volume, reset, rewind and reloaded. Again, the tape bombed at the end of its seemingly endless load. This time the chill began to nibble at my gizzard.

Again and again, with increasing frenzy and impatience I punched reset buttons, twiddled volume dials and waited agonizing minutes, only to see the blinking asterisk replaced with that devil's own C. My eyes commenced to water; my nose ran; my brain pounded; my stomach churned itself into little knots.

The next morning, heavily dosed with Gelusil, I dragged my aching body back to Video Nook.

"Murray, Murray, ya gotta help me." And I related the horrible events of the night before.

He rubbed his hands together and his lips curled into a sneer.

"Oh, I can solve your problem," he said, "if you're ready for it."

"How, Murray, how?"

"Disk!" he said.

"But, Murray," I protested, visions of winged dollars dancing through my brain, "that's a thousand dollars, between the disk drive and the expensive interface."

"That's Expansive Interface," he corrected.

"Yeah, well, anyway, that's more than I've got in the whole rig so far."

"Look, kid," he said coldly, "pay it to me or spend it on Gelusil. It's your choice."

That was the big turning point for me. My brain cried, "Walk out!" but I was too weak to resist and once again my plastic hit the counter.

Soon I was back at my accustomed place, disks madly spinning, aches gone, replaced by an ever-increasing euphoria.

My days were spent dreaming about the mysteries of assembly language, and every night until the wee hours I sat before my TRASH 50H transfixed, like a butterfly impaled on a collector's board.

My appearance began to suffer noticeably. My eyes grew baggy and my pupils contracted from lack of sleep. Of course, I was always waking up late for work, so I threw on yesterday's clothes and didn't have time to shave. The neighbors began to whisper, and during TV commercial breaks my wife began to notice that I wasn't around.

Screaming, Kicking and Scratching

One day my boss called me in.

"Son, is there something wrong at home?"

"No, no!" I said too hastily. "Everything's fine! Just fine!"

"Well," he said, "I can't help noticing such a marked change in you in such a short period of time. I know this may sound silly, but you remind me of a fellow I once

knew who got involved with . . ." he shuddered, "computers."

Of course, I denied it and feigned offense at such a comparison. My boss was a kindly man, but a stern moralist with an abiding hatred for transistors.

One day found me back in Video Nook. A fellow computerist was standing in front of the store's display model, angrily punching at the keyboard. Suddenly he threw himself on the floor, screaming, kicking his feet and scratching at his head.

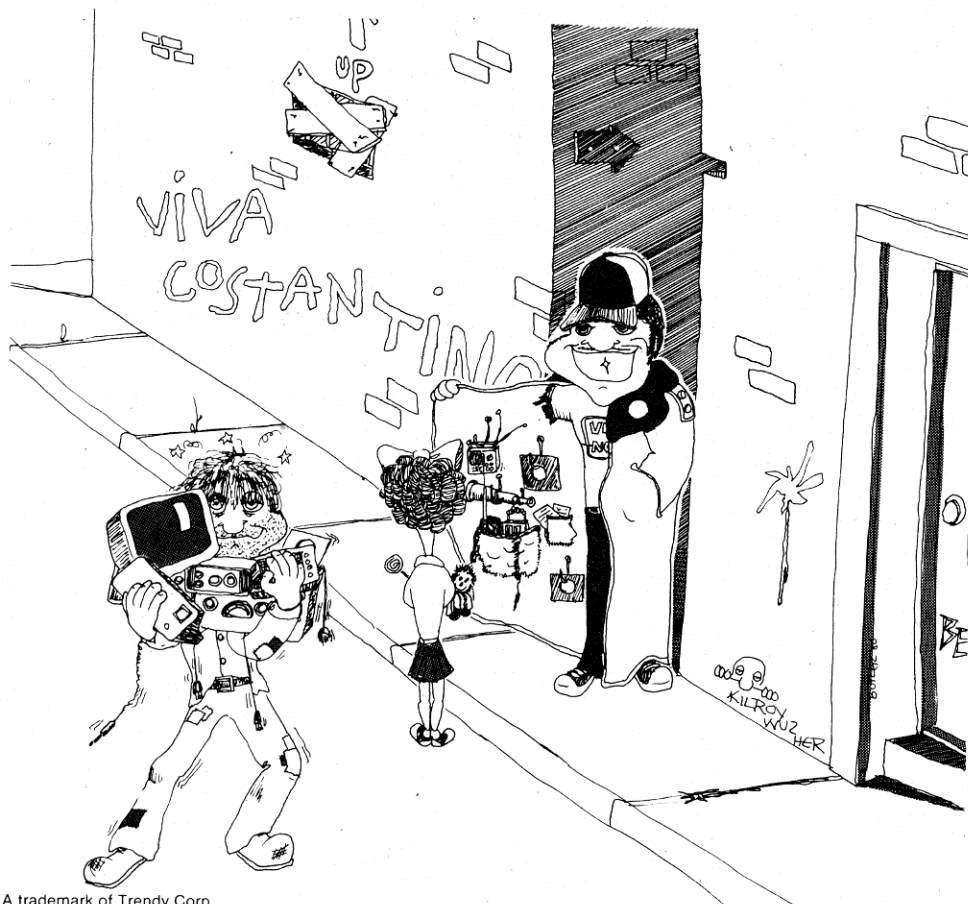
"Murray," I shouted, "what's happening to him?"

"He's seeing bugs."

"Bugs?" I said, with awe.

"Yeah, one of his programs keeps bombing and he can't find the bugs. Don't mind him, it happens all the time. What can I do for you?"

"Murray," I said sheepishly, "I need another



*A trademark of Trendy Corp.

At Last! Affordable WORD PROCESSING Made Possible by TRS-80TM

NEW SCRIPSITTM
Word Processing
Software for 16K
Level II TRS-80s.
\$69⁹⁵ Cassette*
\$99⁹⁵ Disk*

EDIT, DELETE, MODIFY —
then print it error-free, 45
characters per second!

**NEW UPPER
AND LOWER
CASE KIT.**
Available for
new or exist-
ing systems.
\$99 Installed*

**NEW TRS-80 DAISY
WHEEL PRINTER.**
Clean and readable
printing, like the very
finest electric type-
writers.
\$2999*



RADIO SHACK BRINGS YOU A COMPLETE WORD PROCESSING SYSTEM FOR TRS-80 MODEL I COMPUTERS.

Radio Shack smashes another computer "cost barrier" with the new TRS-80 Word Processing System. The system includes our new SCRIPSIT software, Upper/Lower Case Kit and Daisy Wheel Printer. Add it to any 16K Level II TRS-80, or buy a complete system. Once you've tried it, you may never want to use a typewriter again!

The new SCRIPSIT software lets you compose letters and documents of all types on TRS-80's screen in upper case, or upper and lower case with the new Upper/Lower Case Kit. You can move words or entire paragraphs, insert, delete and edit to your heart's content! SCRIPSIT gives you automatic page numbers, page headings and footnotes and makes it easy to indent paragraphs, change line widths, and center your text horizontally or

vertically. Advanced features include justification, hyphenation, global search/replace, and variable screen width. On-going reports, form letters and text with print commands can be stored on TRS-80 cassettes or diskettes for use or revision at any time.



SCRIPSIT software includes an audio cassette course that makes anyone a proficient word processing operator.

PRINT ALL OF THE "ORIGINALS" YOU NEED, FAST AND ERROR-FREE!

Our new WP-50 Daisy Wheel Printer is fast and gives you the same quality of the finest electric typewriters — carbon film ribbon and all! Or, if your job doesn't require "letter" quality, a TRS-80

system with a dot matrix, u/lc printer costs even less.

A complete TRS-80 cassette system with Word Processing Software, Upper/Lower Case Kit and a dot matrix printer is yours for just \$2,046.95*. Or choose a really deluxe system with the WP-50 Printer and two floppy disks that store eight hours of 50 WPM typing for only \$5,492.95*.

Sound exciting? You bet it is! Visit your nearest Radio Shack outlet or write for details.

*Retail prices may vary at individual stores and dealers.

Mail to: Radio Shack, Dept. **CMA-460**
1300 One Tandy Center
Fort Worth, Texas 76102

I'd Like to Know More!

- ☐ Send details on TRS-80 Word Processing and the 24-page TRS-80 Catalog #RSC-3.
☐ Have a representative contact me.

NAME _____
ADDRESS _____
CITY _____
STATE _____ ZIP _____
I Own/Use a TRS-80 ☐ Yes ☐ No
Model _____

Radio Shack[®]
The biggest name in little computersTM

A DIVISION OF TANDY CORPORATION • FORT WORTH, TEXAS 76102

"But, Murray, I need it now. I'm really in a bad way. I'm seeing everything double all the time. Besides, I don't have a buck left, after buying all of those game programs."

**“... I forced my wife to ...
throw Tupperware parties
to pay for a modem and
an RS232 board.”**

"Nah, not me, Murray. I'm still just playing with the stuff."

I WAS A FULL-FLEDGED USER!

MODEL II. ■

This article was written using the Bionic Ballpoint Word Processing System

You can't appreciate Just how NECESSARY dualcase is on your TRS-80 until You've seen it. Once You use dualcase You'll never want to go back to UPPERCASE only again. In fact, You'll wonder how you managed without it for so long.

The character Generator in Your TRS-80 ALREADY contains the following! Greek characters; numbers; special symbols; PLUS both UPPER and lowercase letter sets. Block Graphics are unaffected.

This is what YOU can have.

D T L J S Q W E + = * 0 9 8 7 6 5 4 3 2 1 - ! " # \$ % & ' () * + , - . / : ; [\] ^ _ { | } ~ ` " ' ( ) \* + , - . / : ; [ \ ] ^ \_ { | } ~ `

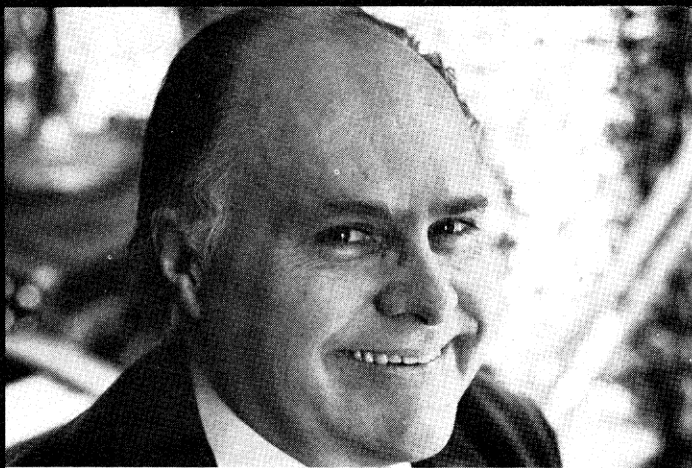
A B C D E F G H I J K L M N O P Q R S T U V W X Y Z 1 2 3 4 5 6 7 8 9 0 . , ' " ' () * + , - . / : ; [\] ^ _ { | } ~ `

N O T E :

The only way to get descending tails with lowercase is to change the Character Generator IC. We will offer one to our customers as a separate modification if there is enough interest.

THE PATCH is a Trademark of CECDAT, Inc. ✓ 195





Wayne Green

Okay, now you've had a chance to see what I have in mind for you with 80 MICROCOMPUTING. Oh, I admit that we're just getting started and that the magazine will be improving a lot as we go along. We have some interesting ideas in the works for you.

With the TRS-80 (or 90 ... etc.) being the most popular microcomputer in the entire world, you are going to benefit from this in many ways. The more computers there are out there of one kind ... the more good programs you are going to have for this system. I hope that is obvious. You may be sure that 80 MICROCOMPUTING will be packed with the shorter programs and reviews of the larger ones. You can waste an awful lot of money on stuff that looks great in the ads, but fizzles out when you try to use it. You need our reviews.

The wealth of programs will also mean that there will be much better programs for the TRS-80 than any other system. Put yourself in the seat of a computer programmer and you'll understand this. If you are going to spend several months developing a comprehensive program, and it takes all of that to write and debug a big program, would you write it for a system which has sold one hundred units or one which has sold over 300,000 systems? The answer is obvious ... and this is why we are already seeing programs coming out for the "80" which are far better than anything for any other system on the market. This is tough for other systems ... the law of the computer jungle.

Between our connections with Instant Software, the largest publisher of microcomputer programs in the world, and Kilobaud MICROCOMPUTING, you know that 80 MICROCOMPUTING is going to be your most important link with software for the TRS-80.

With Instant Software being sold and promoted in every country in the world where the TRS-80 is being sold, our input of programs is also the best in the world. We get programs submitted from everywhere ... often from 50 to 100 a week! You'll get the cream of the crop either published or reviewed in "80".

If coupon below has been used, please fill out subscription form on the reader service card in the back of the magazine.

HARDWARE TOO

The same law of the computer jungle holds for hardware. Would you, as a manufacturer, market an accessory for a system which has sold 100 units or would you go first for the one which has sold hundreds of thousands. It is, as with software, self-evident why the great bulk of the hardware accessories for computers are for the TRS-80 these days.

80 MICROCOMPUTING has the advantage of the use of the largest and most complete microcomputer lab in the world ... the one developed for Instant Software and Kilobaud MICROCOMPUTING. This means that most new pieces of equipment are tested and in use by our staff ... and this means that we can tell you what we think is outstanding ... and where we find ripoffs. This lab is important to you.

SUBSCRIBE

If you are not already a subscriber to 80 MICROCOMPUTING, please get signed up right now. The yearly rates are \$15, and that is a bargain. Just one single program of use to you can be worth much more than that. One review of an accessory could save you many times that much investment. I would appreciate it if you would appoint yourself a committee of one to get more subscribers for the magazine. You will benefit even more than we do here at the magazine ... because the more readers we have, the more ads we will be able to attract ... and the more ads, the more pages of articles you will get every month.

The "80" market can, I think, support a couple of hundred pages of ads ... and that would mean a magazine of nearly 500 pages a month. That should hold you. You may not have time left to use your computer.

ENCYCLOPEDIA

If you've read Kilobaud MICROCOMPUTING, you know that I try hard not to duplicate published material. My concept is that every reader should save every issue (we sell inexpensive boxes for this so they can sit on your library shelf) and treat the magazine as a continuing encyclopedia of computing. I make sure that much of the material in each issue is written in simple language so it will be understandable by even the rawest newcomer to computers. Oh, I have articles for the more advanced users too, so you'll have something to look back over later and use as your understanding of your system grows.

Try to think of 80 MICROCOMPUTING as more of a large club newsletter than an ivory tower high-level publication. I'll leave the pomp to other publishers ... the ones with the well-deserved inferiority complexes who cater to their inadequacies by publishing esoteric baloney. This magazine is written by the readers and edited by people whose aim is to help you enjoy your TRS-80.

SAVE

With each issue costing \$2 at your computer store, that's \$24 a year. For \$15 a year you can subscribe ... at least for now. As the magazine expands, please do not be surprised if the cover price increases, along with the subscription price. I started 73 Magazine for radio amateurs twenty years ago with a cover price of 37¢ (two for 73¢) and it is up to \$2.50 a copy now (and it is the largest of the ham magazines).

For you bargain hunters ... and those who find that one year goes by all too rapidly, the three year rate for "80" is \$36. This, too, will be going up ... reflecting the inflation, paper increases, postage increases, and a short vacation for me in Hong Kong next year. Someone has to pay for that.

YES! Sign me on as a subscriber to 80 Microcomputing for only \$15 a year!

Card # _____ Exp. _____
Signature _____
Name _____
Address _____ State _____ Zip _____
City _____

- ☐ 12 issues — \$15
- ☐ 36 issues — \$36
- ☐ Please bill me
- ☐ Payment Enclosed
- ☐ Master Charge
- ☐ VISA
- ☐ American Express

80 microcomputing TM

Subscription begins with next published issue.
Back issues, while available, are \$3 each.
Canada: \$15 per year US funds.
All other foreign subscriptions \$20, one year only, US currency only.
PO Box 981 • Farmingdale NY 11737

304B8

More for Less.

Speed. Capacity. Price.

The Vista V-80 mini disk system is 8 times faster than the TRS-80, 23% more storage capacity, and costs only \$395.

Compare our performance to Radio Shack's TRS-80*. Then match our price with theirs. Then decide which one is for you.

Features

- Vista offers 102K bytes to Radio Shack's 89K. That's 13K more bytes per drive for Vista.
- The V-80 operates at 12ms versus 40ms for TRS-80. Our drive can operate at 5ms, but only 50% of TRS-80 will operate at that speed; therefore, Vista has purposely set the access time at 12ms.
- Totally compatible with all available disk operating systems.
- Upgraded system. Increased storage and speed patch supplied at no charge by Vista.
- Drives are interchangeable for any location from Drive 0—thru Drive 3.
- Immediate Delivery.
- **120 Day Warranty**

Prices:

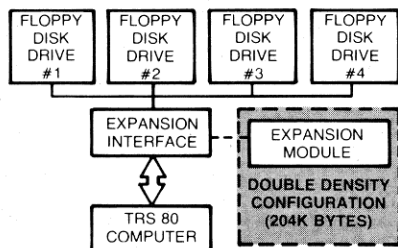
Single Drive System\$395

Two Drive System\$770

Four Drive System\$1450

*TRS-80 is a registered trademark of Radio Shack, a Tandy Company

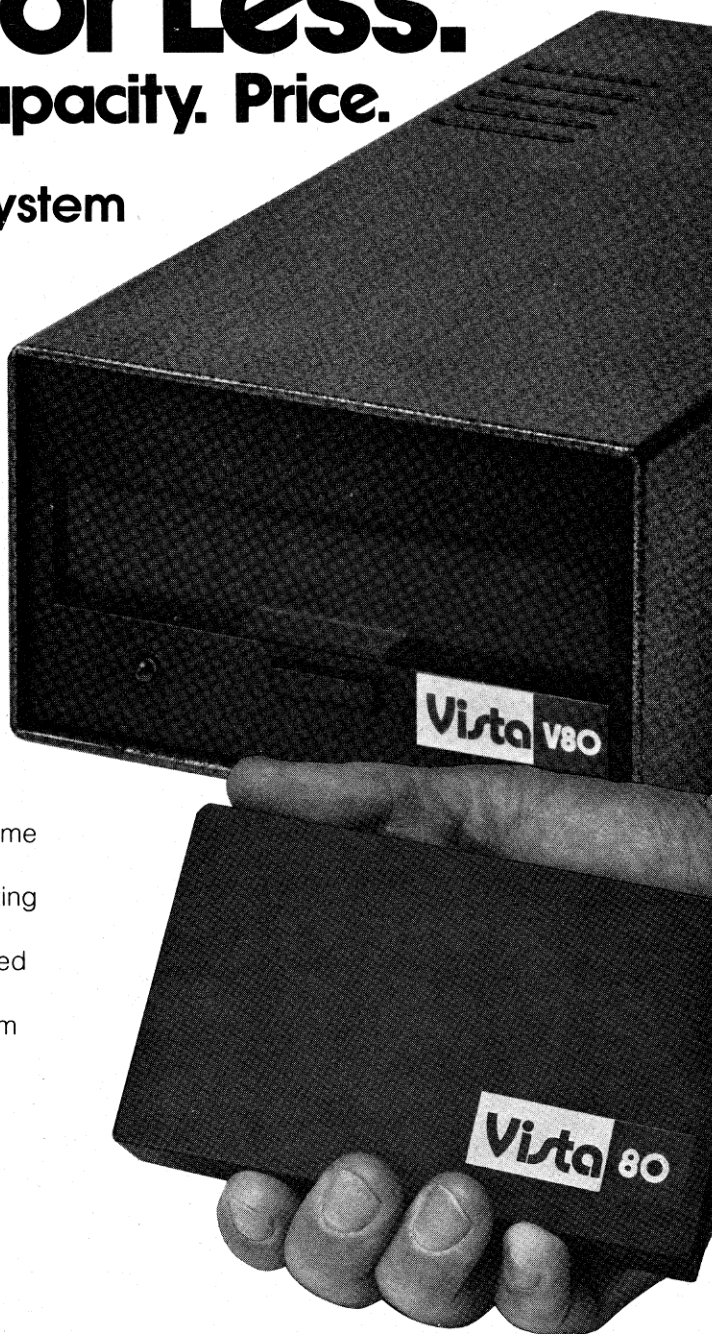
TYPICAL CONFIGURATION



Single Density Configuration (102K Bytes)



The Vista Computer Company 1401 Borchard Street • Santa Ana, California 92705 • 714/953-0523



Vista Expansion Module

The expansion Module provides a double density modification to your current Radio Shack interface that allows you to format diskettes in either single or double density. In double density format, your Vista Drive increases your storage capacity up to 204K bytes on a single 40-track drive.

To insure the highest performance possible, without compromise, we recommend that you use Vista disk drives in conjunction with our Expansion Module.* For a demonstration on your system call **TOLL-FREE 800-854-8017**

Price \$239.00 (includes all hardware and software)

*Vista cannot guarantee Radio Shack drives to operate 100% in double density.

Bigger Is Better.

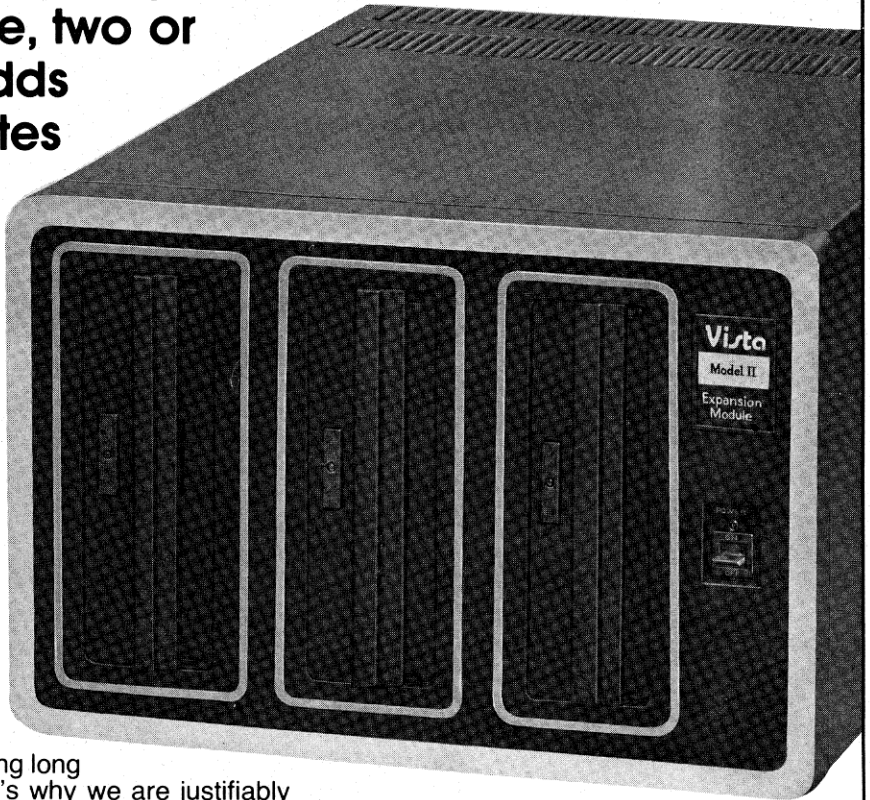
Expandable storage. Greater Versatility.

The Vista Model II* Disk Expansion System provides one, two or three drives, and adds up to 1.5 million bytes of storage.

You say you want more disk storage, more programming versatility . . . at a reasonable price. Say no more. Our Vista Model II Disk Expansion System may be just the answer for you. Choose from 1, 2 or 3 drives, already mounted. Each additional disk drive will add about 1.5 million bytes of on-line storage to your system. Buy only what you need now. As your needs grow, you can continue to expand your capacity by adding another drive. It's that simple.

But the best part we've saved for last. The price. It's cheaper than Radio Shack, yet our Model II will do everything Radio Shack's expansion system can do. The only difference is our Model II will keep on working long after most others have stopped. That's why we are justifiably proud of our product's high reliability. And our **120-day warranty**. Actually, it's not hard to stand behind a product — that works — if you know what we mean.

*Model II is a registered trademark of Radio Shack, a Tandy Corporation.



COMPARE OUR INTRODUCTORY LOW PRICES

1-drive Expansion System	\$1,000	3-drive Expansion System	\$2,100
2-drive Expansion System	\$1,550	Additional Drives Only	\$ 525

NO WAITING • IMMEDIATE DELIVERY.

NAME _____	PLEASE ☒ ONE:
ADDRESS _____	☐ CHECK OR MONEY ORDER ☐ CREDIT CARD ☐ C.O.D.
CITY _____ STATE _____ ZIP _____	PLEASE CHARGE MY CREDIT CARD: _____
TELEPHONE (____) _____	☐ MASTER CHARGE ☐ BANK AMERICARD VISA
OPTIONAL	CARD NO. _____
COMPANY AFFILIATION _____	EXPIRATION DATE _____
TITLE _____	PRINT EXACT NAME OF CARD HOLDER _____
INTENDED APPLICATION _____	SIGNATURE _____

Item	Quantity	Price
Subtotal		_____
Calif. Res. add 6% sales tax		_____
Per-Unit Shipping and Handling		_____
(\$5.00 UPS - \$7.50 UPS Blue)		_____
Total		_____



The Vista Computer Company 1401 Borchard Street • Santa Ana, California 92705 • 714/953-0523 ✓65

*Why bother with the keyboard,
when you can use a magic wand.*

Build a Light Pen

Wayne Holder
2765 Reynard Way
San Diego, CA 92103

your screen with the stroke of a light pen.

What is a light pen? It is a wand that guides and instructs your TRS-80 computer.

To be more technical, the pen is a light sensing peripheral that plugs into the cassette jack on the keyboard or expansion chassis, allowing you to select things on the video screen by pointing at them.

A light pen lets your computer see where you are pointing.

The pen has thousands of uses. Use it for computer games

or to draw pictures on the screen.

Let it answer the questions in a quiz, act as a futuristic control panel for an automated house or for menu selection in business applications.

How It Works

The schematic diagram of the light pen is shown in Fig. 1. Its heart is photodetector PQ1. PQ1 is a VTA-1011 photoDarlington which conducts more current when illuminated. Transistors Q1 and Q2, resistors R1, R2 and R3, and capacitors C1 and C2 compose a bias source for the phototransistor.

This is the kind of voltage regulator, except that it tracks only slow changes in current. Quick

pulses of light cause a change in the voltage across the phototransistor, whereas slow changes in light do not. This allows the circuit to adapt to different ambient light conditions.

The a.c. signal that crosses the phototransistor in response to quick changes in light, is coupled through capacitor C3 and is amplified by transistor Q3. The amplified signal is passed into the TRS-80 circuitry where it simulates a cassette input signal.

It is fortuitous that the computer's input circuit also serves as a light pen input circuit. I won't go into how the TRS-80 circuitry works, but if you are interested, I suggest you read the TRS-80 technical manual.

Imagine the magic effect of moving chess pieces around.

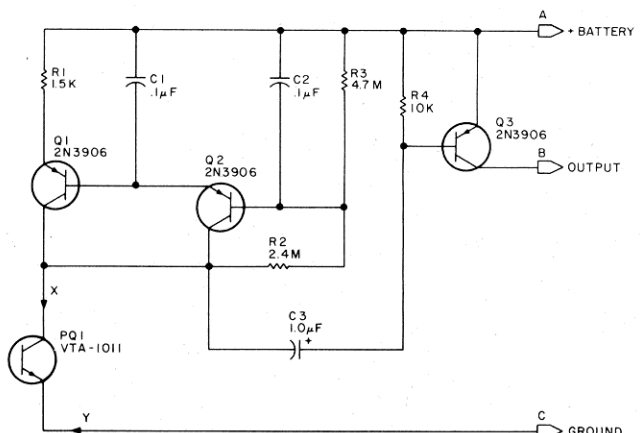


Fig. 1. Light Pen Schematic.

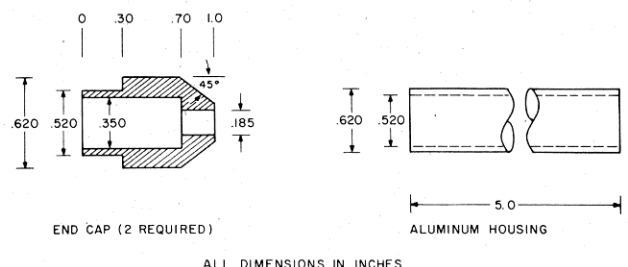


Fig. 2. Aluminum Housing.

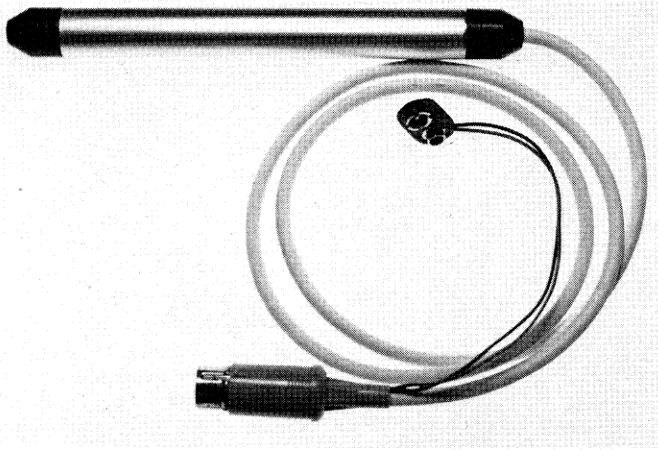


Photo 1. Assembled Light Pen.

Construction Details

A parts kit for the light pen is available that makes building one much simpler. A printed circuit board is provided that considerably reduces the amount of wiring. A specially designed housing, consisting of an aluminum body and machined DELRIN plastic end caps, is also included with the kit.

Photo 1 shows the completed light pen constructed from the kit.

Homebrewers can build the light pen into the body of an old felt tip marker or similar housing. You can wire the circuit on perfboard or similar material. My prototype was constructed in this fashion. If you are skilled with machine tools you may elect to duplicate the kit-supplied housing yourself.

Fig. 2 shows the parts outlines and dimensions for the body and end caps. DELRIN plastic is recommended for machining the end caps, because it is easily worked on a lathe without shattering or chipping. Fig. 3 shows the foil pattern and outline for constructing the printed circuit card.

Fig. 4 shows the component placement on the circuit card. I recommend using a bending

guide to prebend the resistor and capacitor leads before inserting them into the circuit card.

The three 2N3906 transistors are mounted flat against the circuit card so that the completed assembly will fit into the tubular housing with plenty of clearance. The three transistors are mounted such that the rounded side of the case presses against the circuit card and the flat side faces up.

Bend the leads at a 90 degree angle and insert them into the card. Notice that the pattern of holes is different for Q3. Photo 2 shows the assembled circuit card.

Capacitors C1 and C2 are axial lead, ceramic chip type. They were selected specifically for their small size, but any .1 uF nonpolarized capacitor with at least a 25 volt rating may be used.

The same thing applies to capacitor C3, which is a miniature tantalum type.

All resistors are 1/4 Watt composition or film types with a value tolerance of five percent.

Mounting Photodetector

Mounting photodetector PQ1 is very important. Cut off the base lead (the center one) and

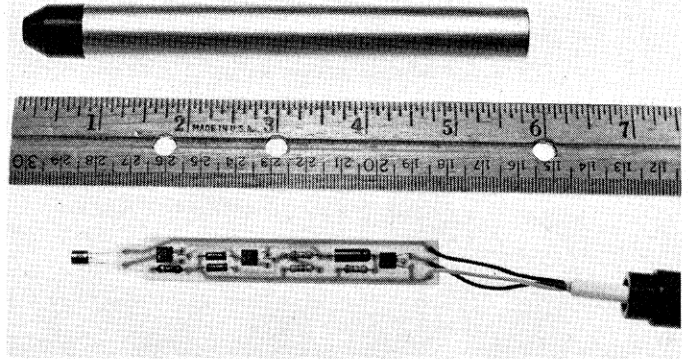


Photo 2. Assembled Circuit Card and Housing.

bend the emitter and collector leads to the length specified in the placement diagram.

The leads should bend in the direction of the now-removed base lead. The emitter lead (the one nearest the tab) connects to the Y pad and the collector lead connects to the X pad of the circuit card.

Insert all of the components into the circuit card. Be careful to check that they are all flat against the surface, so that the card will fit into the housing. Then solder them into place.

Use a good grade rosin core solder, and be careful not to excessively overheat any of the components. Trim the leads as close to the circuit card as possible to prevent them from shorting to the aluminum housing.

Check the position of the phototransistor by inserting the P.C. assembly into one of the end caps. If you have measured correctly, the narrow end of the card would fit into the end cap all the way. The end of the phototransistor should be recessed from the other end about 1/4 of an inch.

Next, wire the connector to the cable and battery clip, using Fig. 5 as a guide. If you are using

the cable supplied in the kit of parts, twist together the cable shield, the brown wire in the cable and the black wire from the battery clip. Solder them to pin 2 of the connector.

Twist together the white wire from the cable and the red wire from the battery clip. Solder them, and insulate the soldered joint with tape or heat shrink tubing.

Solder the green wire from the cable to pin 4 of the connector. Assemble the connector, being careful to crimp the cable and battery clip wires into the strain relief tabs.

Slip the other end of the cable through one of the end caps. Pull about four inches through and fasten a nylon ty-wrap around the cable near the end cap. The ty-wrap will prevent the cable from pulling out of the end cap once the pen is assembled.

Strip the insulation from the cable and trim the wires so that they measure about two inches from the end of the end cap. Solder the white wire to point "A" on the circuit card (Fig. 4). Solder the green wire to point "B" and the brown wire to point "C." Trim off the excess wire after soldering.

At this point your light pen is

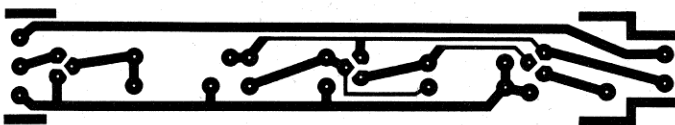


Fig. 3. P.C. Foil Pattern.

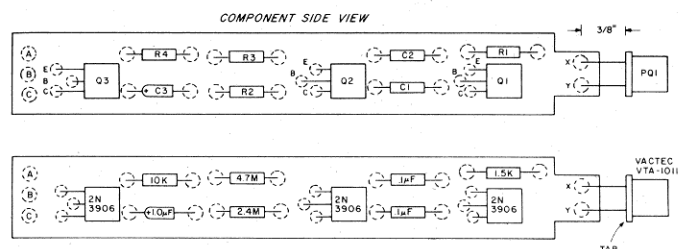


Fig. 4. Components Placement Guide.

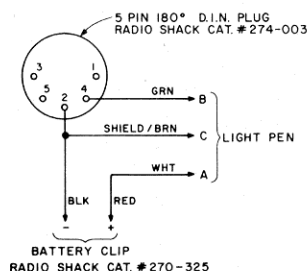


Fig. 5. Plug/Cable Wiring.

almost ready to operate. Before final assembly test it by plugging it into the keyboard, connecting a battery and running the program shown in Listing 1.

I advise, however, that you first read the section on programming.

When you are satisfied that your light pen is working correctly, assemble it into the housing, using epoxy cement to fasten the end caps into the aluminum tube.

Programming

The pen is a device that can sense light coming from the video monitor. Software is used to distinguish exactly where the light pen is pointing, but the software must be accurate. Let's take a look at exactly what is involved in programming a light pen.

When we look at the screen of the video monitor, we see continuous light. Those of us who are savvy about how television works know that the light is not really continuous.

Television creates images by scanning a point of light across the television screen. This point of light scans so rapidly that to our human eyes it appears to be everywhere at once.

The photosensor of the light pen, however, is not so easily fooled. It sees a pulse of light every time the point scans past wherever the light pen is pointing.

The video monitor is designed to scan from the top to the bottom of the screen 60 times a second or once every 1/60 of a second. This means the light pen sees 60 pulses of light every second whenever the light pen is pointed at an illuminated area on the screen.

The light pen converts these light pulses into electrical pulses. The electrical pulses are fed into the TRS-80's cassette input latch. A latch is a device that stores information. It has two states: SET (on) or RESET (off).

The TRS-80 is able to RESET the latch, while the light pen can SET it.

In addition, the TRS-80 can determine the state of the latch at any time. The light pen SETS the latch every time it senses a pulse of light from the video monitor. Once the latch is SET, it stays in that state until it is RESET by the TRS-80. Therefore, to detect whether or not the light pen is "looking" at light, we need only to RESET the latch, wait at least 1/60 of a second, and then check the latch to see if it is SET.

BASIC program 1 clears the screen (statement 10) and puts a spot of light in the center of the screen (20). Statement 30 RESETS the latch. (Read the TRS-80 technical manual for more details.)

Statement 40 delays execution for about 1/60 of a second. Statement 50 reads the state of the latch and decides which message (ON or OFF) to print.

Type in the program, connect the light pen and run it. You will find that pointing the light pen at the spot of light displays the ON message in the upper left corner of the screen; otherwise the OFF message will show.

Now look at the subroutine shown in Program Listing 2. This subroutine does all the work of testing to see if the light pen is looking at light. If a program performs a GOSUB 9000 upon return, the variable LP will be set to 0 if the light pen is looking at darkness or 128 if the pen sees light. We will make use of this basic subroutine in developing more sophisticated programs.

Some Programming Examples

Naturally, the software must do more than simply determine if the light pen sees light. The pen could easily pick up a stray pulse of light from a light fixture, or by being pointed at a line of text. Good software must, therefore, include checks to verify where the light pen is actually being pointed. Enter the BASIC program shown in Listing 3 and try it.

This program expects you to point the light pen at the "*" displayed on the screen. The program calls subroutine 9000 and tests the returned value in variable LP, in order to wait until the light pen senses light (state-

ments 30 and 40).

The program then tries turning the "*" on and off several times and calls 9000 each time. The program is checking to see if the light pen sees light with the "*" on, and, also, if it sees no light with the "*" off. The program does not decide that the light pen is looking at the "*" until it can successfully repeat this test several times.

This double checking is very important for proper operation of any light pen program.

Now let's look at another light pen application called Menu Selection. Most of us have used programs that required us to choose among various options. The game Star Trek, popular in most computer circles, is an example.

To play the game the player is usually requested to "TYPE 1 TO FIRE PHASORS, TYPE 2 TO FIRE PHOTON TORPEDOES, TYPE 3 TO SCAN QUADRANT FOR LIFE" etc. Wouldn't it be great if your computer had separate keys labeled with each option? You can use the light pen in this application.

Consider if the screen showed something like this:

- * FIRE PHOTON TORPEDOES
- * FIRE PHASORS
- * SCAN FOR LIFE IN QUADRANT
- * SURRENDER

You could play the game by touching the light pen to the "*" next to the appropriate command. Perhaps certain commands would call up other Menus of commands for us to select from.

Imaginary Restaurant

We don't have space here to present a complete Star Trek program, but try the program shown in Listing 4. The program is called "Imaginary Restaurant," and you use the light pen to select what you would like to eat from the bill of fare.

Statements 5 through 40 reserve string space and dimension the arrays A\$ and B. Array B is then initialized to the values 192, 320 and 448 which correspond to areas on the screen that will be changed with the PRINT @ command.

```
10 CLS
20 SET (64,24):SET(65,24)
30 OUT 255,0
40 FOR X=0 TO 6: NEXT X
50 IF (INP(255) AND 128)=0 GOTO 70
60 PRINT @ 0;"ON": GOTO 30
70 PRINT @ 0;"OFF": GOTO 30
```

Program Listing 1.

```
9000 OUT 255,0
9010 FOR Z=0 TO 6: NEXT Z
9020 LP=(INP(255) AND 128)
9030 RETURN
```

Program Listing 2.

```
10 CLS
20 PRINT @ 384,"* <= TOUCH HERE"
30 GOSUB 9000
40 IF LP=0 GOTO 30
50 CNT=2
60 PRINT @ 384," "
70 GOSUB 9000
80 PRINT @ 384,"*"
90 IF LP=0 GOTO 30
100 GOSUB 9000
110 IF LP=0 GOTO 30
120 CNT=CNT-1
130 IF CNT<>0 GOTO 60
140 CLS
150 PRINT "DON'T YOU TOUCH ME"
160 STOP
```

Program Listing 3.

Statements 100 through 110 read the contents of the DATA statements into array A\$. The array is initialized to contain messages that the program will display. A\$ is a two-dimensional array organized so that the messages are put into groups of four. Each group corresponds to the X dimension of the array and the particular message in a group corresponds to the Y.

Statement 120 selects the first group by setting X=0.

Statements 200 through 240 display a group of messages on the screen. Message 0, (Y=0) of each group, is displayed as a prompting message at the top of the screen. Messages 1-3 are displayed as choices with a target spot preceding each one. The first group of messages appears as follows.

```
WELCOME TO THE IMAGINARY
RESTAURANT—PLEASE SELECT
* BREAKFAST
* LUNCH
* DINNER
```

The program expects the user to select one of the three choices it offers by pointing to the associated spot with the light pen. The program waits at statement 300 until the pen detects light. When it's detected the program assumes that the user is pointing to one of the three spots.

Statements 310 through 350 determine which one, by turning off each selection. The program assumes the light pen will see darkness when it finds the correct one. As a precaution should the test fail, the program will get to statement 360. The program branches to statement 400 when it thinks it has located the selection.

Statements 400 through 450 perform a double check on this assumption by turning the suspect spot on and off several times, checking for the correct response. If this double check fails, the program branches back to statement 300.

If the check passes, the program displays an arrow <= next to the spot and waits for the light pen to see darkness. This means the user has lifted the pen from the screen.

Statement 500 checks for fur-

ther displayed choices. If they are there, the program sets X to the group requested and branches back to 200. If they are not, the program terminates by printing the final selection.

The Magic Subroutine

Imaginary restaurant is a rather specialized program, as you probably noticed. If light pen input is ever going to be painless, we will need to develop a subroutine to do the hard work for us. Before we get into exactly how we are going to write such a subroutine, let's define how we would like it to work.

The PRINT@ command in Level II BASIC is a very convenient way to display messages anywhere on the screen. Using this command, you can refer to any location on the screen by using a value between 0 and 1023.

Imaginary restaurant made extensive use of the PRINT@ in setting up the display and in turning the light pen targets on and off. Suppose we had a subroutine that would accept a list of locations on the screen, where each location on the screen was described by a value from 0-1023.

Let us further suppose that this subroutine would display a light pen target at each of these locations, wait for the light pen to touch one of them and indicate which one was touched by returning a value.

This will be our magic light pen subroutine. Let us design this subroutine such that the list of locations is contained in an array called "LST", and that the first element of this array, LST(0), will contain a value indicating how many locations are in the list. Therefore, if we wish to display three targets on the screen at locations 120, 430, and 522, we would set up the array as follows:

```
100 LST(0) = 3
110 LST(1) = 120
120 LST(2) = 430
130 LST(3) = 522
```

We would then call our subroutine. (Let's assume it starts at line 9100.) We will design the subroutine to set a

```
5 CLEAR 1200
10 DIM A$(4,4),B(3)
20 B(0)=192
30 B(1)=320
40 B(2)=448

99 REM * READ DATA INTO ARRAYS
100 FOR X=0 TO 3: FOR Y=0 TO 3
110 READ A$(X,Y):NEXT Y,X
120 X=0

199 REM * DISPLAY A SCREEN GROUP
200 CLS
210 PRINT A$(X,0):PRINT:PRINT
220 FOR Y=1 TO 3
230 PRINT CHR$(140);" "A$(X,Y):PRINT
240 NEXT Y

299 REM * WAIT FOR LIGHT PEN TO SENSE LIGHT
300 GOSUB 9000: IF LP=0 GOTO 300
309 REM * FIND WHICH STAR WAS TOUCHED
310 FOR W=0 TO 2
320 PRINT @ B(W)," "
330 GOSUB 9000: IF LP=0 GOTO 400
340 PRINT @ B(W),CHR$(140);
350 NEXT W
360 GOTO 300

399 REM * GET HERE IF PROPER ONE LOCATED, DOUBLE CHECK
400 FOR S=0 TO 1
410 PRINT @ B(W),CHR$(140);
420 GOSUB 9000: IF LP=0 GOTO 300
430 PRINT @ B(W)," "
440 GOSUB 9000: IF LP=128 PRINT @ B(W),CHR$(140); GOTO 300
450 NEXT S
460 PRINT @ B(W),CHR$(140); "<=";
470 S=0
480 S=S+1: GOSUB 9000: IF LP=128 GOTO 470
490 IF S < 5 GOTO 480

499 REM * GET HERE IF DOUBLE CHECK PASSES
500 IF X=0 X=W+1: GOTO 200
510 CLS
520 PRINT @ 192,"VERY GOOD! WE AT THE IMAGINARY"
530 PRINT " RESTAURANT HOPE YOU ENJOY YOUR "
540 PRINT A$(X,W+1);" FOR "A$(0,X)
550 PRINT:PRINT:PRINT
560 PRINT "BY THE WAY YOUR CHECK TOTALS -- $37.50"
570 FOR X=0 TO 5000: NEXT X: GOTO 120

599 REM * DATA AREA
600 DATA "WELCOME TO THE IMAGINARY RESTAURANT - PLEASE SELECT"
610 DATA "BREAKFAST"
620 DATA "LUNCH"
630 DATA "DINNER"
640 DATA "FOR BREAKFAST WE ARE SERVING"
650 DATA "HAM, EGGS, AND SAUSAGE SPECIAL"
660 DATA "PANCAKES AND FRIED POTATOES"
670 DATA "COFFEE AND DANISH"
680 DATA "OUR LUNCH SPECIALS ARE"
690 DATA "HAMBURGER, COKE, AND FRIES"
700 DATA "ROAST BEEF SANDWICH"
710 DATA "VEGETARIAN SPECIAL (RICE AND BEAN CURD)"
720 DATA "FOR DINNER WE ARE PLEASED TO OFFER"
730 DATA "EXPENSIVE STEAK"
740 DATA "OVERPRICED SEAFOOD"
750 DATA "ECONOMY SOUP AND SALAD"
```

Note: Remember to include subroutine at 9000.

Program Listing 4.

```
9100 'MAGIC LIGHT PEN SUBROUTINE
9110 L=LST(0)
9120 C$=CHR$(140)
9130 FOR I=1 TO L ' DISPLAY TARGETS ON SCREEN
9140 PRINT@ LST(I),C$;
9150 NEXT I
9160 GOSUB 9000 ' WAIT FOR LIGHT INPUT FROM PEN
9170 IF LP=0 GOTO 9160
9180 SCAN=1
9190 PRINT@ LST(SCAN)," " ' DETERMINE TARGET TOUCHED
9200 GOSUB 9000
9210 IF LP=0 GOTO 9260
9220 PRINT@ LST(SCAN),C$;
9230 SCAN=SCAN+1
9240 IF SCAN <= L GOTO 9190
9250 GOTO 9160
9260 PRINT@ LST(SCAN),C$; ' TARGET FOUND, DOUBLE CHECK
9270 GOSUB 9000
9280 IF LP=0 GOTO 9160
9290 CNT=2
9300 PRINT@ LST(SCAN)," "
9310 GOSUB 9000
9320 PRINT@ LST(SCAN),C$;
9330 IF LP <> 0 GOTO 9180
9340 GOSUB 9000
9350 IF LP=0 GOTO 9160
9360 CNT=CNT-1
9370 IF CNT <> 0 GOTO 9300
9380 PRINT@ LST(SCAN)-2,">"; ' DISPLAY PROMPT ARROWS
9390 PRINT@ LST(SCAN)+1,"<=";
9400 GOSUB 9000 ' WAIT FOR PEN TO BE LIFTED
9410 IF LP <> 0 GOTO 9400
9420 RETURN
```

Program Listing 5.

variable call "SCAN" equal to the list element index (in this case 1-3), which corresponds to the target location touched by the light pen.

If, for example, the light pen had touched the target displayed at location 430, then SCAN would equal 2 upon returning from the subroutine.

The listing for the Magic Light Pen subroutine is shown in Program Listing 5.

Program Listing 6 is a short program that uses the magic

subroutine to build a simple quiz program.

The subroutine makes use of variables named SCAN, I, LP, CNT, C\$ and the array LST. So don't use them elsewhere. Also remember to DIMension the array LST and to put the proper values into it before doing a GOSUB 9100.

The string variable C\$, which is assigned a value at statement 9120, determines what character will be used as the light pen target. Currently it is set to a

graphic character but you can change it to something else if you like.

Machine Language Programming

The light pen can be used by assembly language programs just as easily as it can be by BASIC programs. Assembly language (sometimes called machine language) has the advantage of being much faster than BASIC. This is a real help when writing light pen programs because you can test more targets on the screen in less time.

A machine language equivalent to the BASIC subroutine at 9000 is shown in Listing 7. This machine language program is presented using Zilog standard Z-80 mnemonics.

This simple subroutine is sufficient to perform all light pen input. I recommend, however, that anyone planning to write machine language programs for the light pen should be thoroughly familiar with assembly language programming.

Should you experience problems with your light pen, the following suggestions could be of help.

If the light pen refuses to work at all, the problem could be a weak or drained battery. Try replacing the battery and then try one of the simple programs such as the ON/OFF test in Listing 1.

If the light pen still refuses to operate, try turning down the lights in the area of the video screen. Adjusting the brightness and contrast on the video monitor may also be of help. The light pen is most sensitive to the video screen when the contrast and brightness are adjusted for a bright, clear image with a dark background.

Sources for Parts or an Assembled Light Pen

A complete assembled and tested light pen, instruction manual and program cassette can be purchased from myself at OASIS SYSTEMS, 2765 Reynard Way, San Diego CA 92103 for \$29.95.

A complete kit of all parts needed to build a light pen including an etched and drilled circuit card, all components, aluminum housing, DELRIN plastic end caps, cable, and instructions is also available for \$19.95. California residents must include the sales tax. Shipping charges are included in the price, EXCEPT on orders from outside the U.S. These must include \$2.50 additional shipping and handling charge. ■

Note: Recent models of the TRS-80 computer and those which have had the cassette fix installed may not work correctly with the light pen, unless a 1K ohm resistor is installed between points B and C on the circuit card. This resistor may also be installed between pins 2 and 4 inside the D.I.N. connector.

```

100 DIM LST(4)
110 LST(0) = 3
120 LST(1) = 266
130 LST(2) = 394
140 LST(3) = 522
150 CLS
160 PRINT "WHO WAS THE SECOND PRESIDENT OF THE U.S. ?"
170 PRINT LST(1)+4, "THOMAS JEFFERSON"
180 PRINT LST(2)+4, "JOHN ADAMS"
190 PRINT LST(3)+4, "PAUL HARVEY"
200 GOSUB 9100
210 CLS
220 IF SCAN = 2 PRINT "THAT IS CORRECT!"
230 IF SCAN <> 2 PRINT "I'M SORRY YOU ARE WRONG!"
240 STOP

```

Program Listing 6.

```

LPEN:
; SUBROUTINE TO READ LIGHT PEN STATUS AND RETURN
; AC = 0 IF 'NO LIGHT' OR 128 IF LIGHT

PUSH HL
LD HL, 1500
LD A, 0
OUT (255), A

LOOP:
; DELAY FOR 1/60 OF A SECOND
DEC HL
LD A, H
OR L
JP NZ, LOOP
IN A, (255)
AND 128
POP HL
RET

```

Program Listing 7.

FORTH is an advanced language/system for advanced programmers. MMSFORTH is a professional version tailored to the Radio Shack TRS-80 Model 1, and professionally supported by MMS.

Interpreter, Compiler, Assembler, Full-Screen Editor
Structured & Modular Programming
Expandable Instruction Set w/Source Code
Graphics, Strings, Arrays, Double-Precision
Very Fast and Compact, Virtual Memory
Includes 5 Demo Programs w/Source Code

MMSFORTH System Diskette (16K, 1 drive) \$64.95
MMSFORTH System Cassette (16K, Level II) \$44.95
microFORTH PRIMER (required for above) \$15.00
THE DATAHANDLER in MMSFORTH (32K, 1 drive) — an exceptionally fast, flexible and easy to use Data Base Management System \$49.95
P.I.M.S. Manual (required for DATAHANDLER) \$9.95
FLOATING POINT MATH and FULL Z80 ASSEMBLER Diskette (16K, 1 drive) \$29.95
Other FORTH literature: more detailed and advanced than USING FORTH PRIMER \$19.95
microFORTH MANUAL — very readable introduction \$6.95
FORTH TUTORIAL MANUAL — good on FORTH internal structure \$2.00
CALTECH FORTH MANUAL — good on FORTH internal structure \$2.00
Shipping is \$2 plus \$1 per extra book (Mass. orders add 5% tax, foreign plus 15%)

mmsFORTH
MILLER MICROCOMPUTER SERVICES
61 Lake Shore Road, Natick, MA 01901 (617) 653-6136
Send SASE for free information

IBM SELECTRIC PRINTER



Consists of a refurbished IBM Selectric printer mechanism housed in an Intel 1041 case. Connects to the line printer port on the TRS-80 Expansion Interface. Includes printer, interface electronics, cables, and a software driver. May also be used independently of the TRS-80 as a typewriter.

TU 801041 in stock \$ 729

TRS-80 INTERFACE TO RS-232 PRINTER

This fine accessory connects a RS 232 printer to the line printer port of the TRS-80 Expansion Interface. NO software driver is required... simply use the LLIST/PRINT commands. Runs at 1200 baud (other baud rates available). Assembled, tested, nothing else to buy... plug in and use.

TU 8014 in stock \$ 69.95

SELECTRIC REPAIR, PARTS, MANUALS, AND FILM RIBBONS FOR ALL SELECTRICS.

TYPEWRITERS UNLIMITED

1408 10400 STREET
WOODBRIDGE VIRGINIA
22191

136
PHONE ORDERS ACCEPTED 703-494-4057
PLUS SHIPPING SPECIFY UPS OR OTHER
VIRGINIA RESIDENTS ADD 4% TAX

BREAK THE 16K BARRIER!

Med Systems Software at last provides the TRS-80 user with a 16K RAM resident mixology data base management system that far surpasses any comparable software on the market today. This system maintains drink recipes in an encoded format which greatly expands the apparent on-board storage capabilities. The data base comes pre-initialized with 102 full page recipes of popular mixed drinks, each complete with ingredients, glass type, mixing instructions, garnishes, and cross-reference to 14 categories.

User additions to the data base are easily accomplished and fully explained in the accompanying booklet, *The Basic Bartender*. Each order is shipped with a two week money-back guarantee and an extra C-10 cassette for back-up copying. All orders are mailed within 48 hours.

TRS-80 16K Level II cassette \$9.95
N.C. residents please add 4% tax.

"TRS-80 is a registered trademark of TANDY CORP."

Med Systems Software

P.O. Box 2674, Chapel Hill, N.C. 27514 ✓ 128



I made the TRS-80* into a serious computer. Now I've made the Model II into a spectacular one.

I'm Irwin Taranto, and I've helped almost a thousand businesses get their first computers up and running.

I've done it primarily with the TRS-80, because it's a really elegant piece of hardware. Given the right programs, it can do substantially the same work as the traditional minicomputers that cost four times as much.

I proved it with four on-line, interactive programs adapted from the genuine Osborne & Associates systems, originally designed for the \$30,000 Wang computer. Then I added two of my own and made them all work on a \$4000 TRS-80.

Now I've done the same thing for the new TRS-80 Model II. It's an \$8000 computer that works twice as fast and has four times the memory—up to two million characters.

My new systems are fully documented, and because I'm working with a much more powerful computer, they're a night-and-day advance over the Model I programs. They'll turn your Model II into a complete business computer, set up and ready to go.

THE TRS-80 MODEL II PROGRAMS

General Ledger/Cash Journal: handles up to 7000 transactions on 500 different user-defined accounts. It keeps track of them by month, quarter and year, makes comparisons to the prior year, and does departmentalization.

Accounts Payable/Purchase Order: generates the purchase order and posts the item to payables when the goods are received. Invoice-linked, it calculates and prints checks and aged ledger reports and links fully to the general ledger.

Accounts Receivable/Invoicing: keeps track of billed and unbilled invoices, open and closed items, aging and service charge calculation. It prints statements, links to the general ledger, and can work within either an invoice-linked or balance-forward accounting system.

Payroll/Job Costing: computes regular, overtime and piecework pay, keeps employee files, figures taxes and deductions, prints checks, journal, 941-A and W-2 forms, and breaks out individual job costs.

*A trademark of the Tandy Corporation.

When I say set up and ready to go, I mean just that. If you're not quite sure on that point, call the number below and we'll give you the names of some of the people who've already bought all over the world. Call them up and hear what they have to say.

These Model II programs are completely custom-tailored, which explains their \$249.95 price. Before we'll send you a disk, you have to fill out a detailed questionnaire that tells us your precise business requirements. Then we send you the disk, all the instructions you need, and my phone number. If you call, we answer all your questions. If your questions are tough enough, I'll talk to you personally.

Because that way I'll make sure that Model II of yours turns into a spectacular computer, just like I promised.

☐ Please send me the custom questionnaires for the following \$249.95 Model II programs:

- ☐ General Ledger/Cash Journal
- ☐ Accounts Payable/Purchase Order
- ☐ Accounts Receivable/Invoicing
- ☐ Payroll/Job Costing

☐ Please send me information on the TRS-80 Model I programs at \$99.95 each

☐ Please send me information on other Taranto business programs

Your name _____

Company name _____

Address _____

City/State/Zip _____

✓ 45

Taranto
& ASSOCIATES, INC.

P.O. Box 6073, 4136 Redwood Hwy., San Rafael CA 94903 • (415) 472-2670

NEW FROM**RACET COMPUTES****DISK SORT MERGE 'DSM' FOR MOD I AND MOD II** TRS-80™****FAST →**Now you can sort an 85K diskette
in less than 3 minutes***← FAST**

Perfect for your multi-diskette RANDOM file mailing lists, inventory, etc. Ideal for specialized report generation, sort, merge or combination. All machine language stand-alone package — Efficient and easy to use. No separate key files required! Physical records are rearranged on diskette! Supports multiple sub records per sector including optional sector spanning. Sorts on one or more fields — ascending or descending. Sort fields within records may be character, integer, and floating-point binary. Provides optional output field deletion, rearrangement, and padding.

*Sort timings shown below are nominal times. Times will vary based on sort and system configurations. Nominal times based on Mod I 48K 4-drive configuration, 64 byte records, and 5 sort keys.

TYPE	FILE SIZE (Bytes)	SORT TIME (Sec)	TYPE	FILE SIZE (Bytes)	SORT TIME (Sec)
SORT	16K	33	SORT	340K	1081
SORT	32K	49	SORT	680K	2569
SORT	85K	173	SORT and	85K SORT +	1757
SORT	170K	445	MERGE	1275K Merge	

DSM for Mod I (Minimum 32K, 2-drives) \$75 On-Disk**DSM for Mod II (Minimum 64K, 1-drive) \$150 On-Disk******Mod II Development Package \$100****

Machine Language SUPERZAP, plus Editor/Assembler and Disassembler patches.

Mod II Generalized Subroutine Facility 'GSF' \$50**

**For Mod II Programs, Include Mod II DOS diskette with order For Development Package, also include copy of Apparatus NEWDOS + 5 1/4 diskette.

CHECK, VISA, M/C, C.O.D.**Calif. Residents add 6%****Telephone Orders Accepted (714) 637-5016**

WHEN ORDERING PLEASE
ADVISE PUBLICATION SOURCE

∞ BASIC for Level II and Disk Systems \$49.95

Full MATRIX Functions — 30 BASIC commands!!

Mathematical and common matrix functions. Change arrays in mid-program. Complete array handling. Tape array read and write, including strings. Common subroutine calls.

Over 50 more STRING Functions as BASIC commands!! String manipulation, translation, compression, copying, search, screen control, pointer manipulation and utility functions. Includes multikey multivariable machine language sorts. Load only machine language functions that you want! Where you want in memory! Relocating linking loader! More than you ever expected!!

∞ BUSINESS (Requires Infinite BASIC) \$29.95

20 Business oriented functions including:

Printer Automatic Pagination with headers and footers!

Packed Decimal Arithmetic (+, -, *, /) 127 digits!

Binary array searches and hash code generator!

COMPROC Command Processor for Disk Systems \$19.95

Auto your disk to perform any sequence of DOS commands, machine language loads, BASIC, memory size, run program, respond to input statements, etc. Single BASIC command file defines execution! Includes auto key-debounce, screen print and lower case software driver.

REMODEL + PROLOAD Specify 16, 32, or 48K Memory \$34.95

Renummer any portion or all of BASIC program. MOVE any portion of program from one location to another. DELETE program lines. MERGE all or any portion from tape. Save and verify portion or all of combined merged programs to tape.

GSF (Specify 16, 32, or 48K) \$24.95

18 Machine language routines. Includes RACET sorts.

TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORPORATION

✓ 41

RACET COMPUTES
702 Palmdale, Orange CA 92665

INTRODUCING THE HOTTEST "FIX-IT" BOOK YET!**"TRS-80 DISK AND OTHER MYSTERIES"**

by Harvard C. Pennington

Here it is . . . THE complete "disk reference manual" for your TRS-80!

An excellent manual and tutor for beginners and professionals alike.

132 pages, jam packed with **HOW TO** information including detailed examples, samples and in-depth explanations in **PLAIN ENGLISH**

REVEALS ALL, IN EVERYDAY PLAIN ENGLISH

How to recover LOST FILES, HASH CODES, KILLED FILES,
CLOBBED DIRECTORIES, BAD PARITY ERRORS, GAT & HIT ERRORS,
UNREADABLE DIRECTORIES, DIRECT STATEMENT IN FILE ERRORS,
ELECTRIC PENCIL ERRORS & LOST PENCIL FILES,

RECOVER ELECTRICALLY OR PHYSICALLY DAMAGED DISKS,

RECOVER FROM A DOS ERROR 22 IN PENCIL, MAKE BASIC PROGRAMS UNLISTABLE,

RECOVER OVER-WRITTEN FILES, READ OR EDIT ANY BASIC PROGRAM WITH ELECTRIC PENCIL,

REMOVE PROTECT STATUS, HOW TO USE SUPERZAP

. And the list goes on and on.

Here is what the noted microcomputer author, **WILLIAM BARDEN, JR.**

has to say about this valuable manual:

" this extensive book by Harv Pennington is clearly presented and packed with good disk information. My advice to any TRS-80 user is to
GET IT, AND USE IT!"

**"LARGE 8 1/2 BY 11 EASY-TO-READ FORMAT, OVER 130 PAGES"**

*TRS-80 is a Trademark of TANDY CORP.

• ORDER TODAY!

**SEE YOUR FAVORITE
COMPUTER STORE
OR ORDER DIRECT**

Send just \$22.50 (Calif. add 6% tax) plus \$1.00 postage to:

IJG, INCORPORATED

569 North Mountain Ave. — Suite B

Upland, California 91768

(Sorry, no COD's on this special offer)

**VOLUME DISCOUNTS AVAIL.
DEALERS — RETAILERS
BOOK STORES**

Make inquiries on your letterhead

*A further report from Loyola University
on their successful computer education course.*

More Night School

Dr. Antonio M. Lopez, Jr.
Dept. of Mathematical Sciences
Loyola University
New Orleans, LA 70118

Having run a successful continuing education program for beginners (Night School, 80 *Microcomputing*, January, 1980), it seemed natural for Loyola to develop an advanced seminar using the TRS-80 BASIC Level II system.

The five evening seminar, held last June, was aimed at the non-beginner who was considering upgrading his existing system.

Each session focused on specific hardware, such as the TRS-80 BASIC Level II unit with 16K of memory and the cassette recorder for auxiliary storage. Later sessions "added on" equipment.

Adding the EDIT and MONITOR modes left some participants confused. Since working with the MONITOR mode requires more technical skill, we did little more than introduce it.

However, the EDIT mode sparked a good deal of interest, and by the end of the seminar the participants were glad to have it around.

I introduced the participants to the "TRS-80 Level II Reference Manual Index" produced by Sherman P. Wantz (*Microcomputing*, February, 1979). Like the EDIT command, this saved the students a lot of time by the end of the seminar.

Initial Application

Since one of the computer's chief contributions to any organization is file management, I devised the following software problem.

Suppose a small retail store carried at most 100 items of inventory. The store owner would like to read his current inventory into his system each morning and store it on cassette tape. During the day, additions, deletions and changes must be directly entered into the system. The store owner would have a current view of inventory at any moment.

At the end of the day, a new inventory file would be created by

copying the information to cassette. Table 1 shows the data record format.

Since physical inventory normally occurs only once a year, we decided to write two programs for this system. The first created the inventory master file after the physical inventory.

The second program read the old inventory master file each morning, manipulated it during the day and produced a new inventory master file at the close of business. As a final touch, a list of those items falling below their reorder points was displayed at the end of the day.

The create program, Listing 1, gently eased the participants into working with a Level II system. It demonstrated some of the slight differences like PRINT @ and PRINT #1 instead of PRINT AT and PRINT # respectively.

The update program, Listing 2, was a different matter. First of all, it was relatively longer than most of the programs the participants had ever tried to understand or key into the computer. Secondly, it introduced the use not only of arrays other than A (found in Level I) but string arrays, as well.

OR, ON...GOTO..., INPUT#1, and PRINT CHR\$(23), not available in Level I, were all introduced, as well as the menu driver, response editing and the use of dummy records.

In the first session, we limited our inventory to 100 items, because of the lack of memory. The obvious solution to a stor-

age problem was to "batch" the transactions and run them all through the computer at one time. This did not provide the store owner in our scenario with an immediate view of his inventory, but it did give him a daily view.

We upgraded our system for the second session by adding an expansion interface with no extra memory and a second cassette recorder.

Sequential Files

When numerous records in a master file must be updated, sequential files have proved efficient. These require that the records of the master file be keyed in some order.

When batch processing takes place, the master file is set against a transaction file containing the additions, deletions and changes. This transaction file must also be arranged in sequence, based upon the same key (Fig. 1).

Formally, the basic logic for a sequential file update is:

1. Read a master record.
2. Read a transaction record.
3. Compare the keys in both records:
 - a. If the transaction key = the master key, we can execute a change or a deletion.
 - b. If the transaction key < the master key, we can add the transaction to the new master file.
 - c. If the transaction key > the master key, we copy the old master record to

Field	Length	Attribute	Variable Name
ITEM #	5	String	IS
DESCRIPTION	30	String	D\$
COST	6	Single Precision	C
DATE OF PRICING	6	Single Precision	D
QTY ON HAND	6	Single Precision	Q
REORDER POINT	6	Single Precision	R
DISCOUNT INFO	30	String	DIS

Table 1.

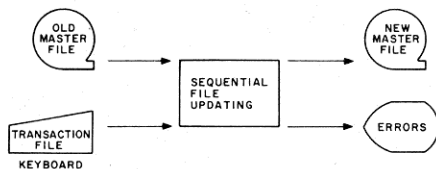


Fig. 1.

the new master file.

4. If we encounter the dummy record of the old master file, we just add the remaining transaction records to the new master file.
5. If we finish entering the transaction records and there is still information left in the old master file, we just copy all the remaining old master records to the new master file.

For the second session, we used a scenario that allowed the participants to work with tape sequential files.

Suppose the membership chairperson of a local chapter of a national organization wished to computerize the membership

list. There were some one hundred members and monthly additions, changes and deletions.

The record format for the data to be stored is given in Table 2. A dummy record was used to indicate the end of the file.

Again, we decided to write two programs. The first program in Listing 3 is a tape creation of a sequential file. The second program in Listing 4 is a tape update of a sequential file.

The flowchart in Fig. 2 illustrates the update program. Key blocks are numbered in the flowchart to correlate to line numbers in the BASIC program.

The Third Session

In the third session, we added a line printer and an RS-232 to

our TRS-80. The line printer afforded us the luxury of hard copies of programs and reports. We discussed the LLIST and LPRINT commands and demonstrated them. The line printer was then connected to the RS-232 and the same demonstrations were run.

Next, we used the RS-232 and a telephone interface II to connect the TRS-80 to Loyola's HP3000 Series III minicomputer. We upgraded our system for the second time by adding 16K more of RAM and a minifloppy disk drive. We were now in the world of DISK BASIC and TRSDOS, the TRS-80 disk operating system.

TRSDOS is a program that is provided by Radio Shack to simplify communication between the user and the hardware and software being controlled.

We discussed only a few TRSDOS commands—KILL, DIR, COPY, FREE, LIB, LIST,

PRINT. These gave the audience a general feel for TRSDOS and the minifloppy disk system. Finally, we talked about two of the utilities provided by TRSDOS—BACKUP and FORMAT. Using our single drive, we backed up a floppy and then invoked BASIC.

Once the screen cleared, the answer to the question, HOW MANY FILES?, was anything but clear. The number entered in answer to this question tells DISK BASIC how many buffers to create to handle disk accesses.

"But what's a buffer? And what do you mean handle disk accesses?" The questions poured forth.

A buffer is a memory area set aside for temporary storage of input or output data. There are two kinds of accesses supported by DISK BASIC—sequential and random. This leads to a discussion of the OPEN and CLOSE commands and the dis-

THE ULTIMATE TRS-80 SPEED-UP!

Mumford Micro Systems announces the release of the SK-2: The most versatile clock modification for the TRS-80 available. It features three speeds: normal (1.77MHz), 50% faster, or 50% slower; selectable at any time without interrupting execution or crashing the program. It may be configured by the user to change speed with a toggle switch or on software command. It may be tied to the expansion interface and will automatically return to normal speed anytime a disk drive is active. It even has provisions for adding an LED to indicate when the computer is not at the normal speed. It mounts inside the keyboard unit with only 4 necessary connections for the switch option (switch not included), and is easily removed if the computer ever needs service. The SK-2 comes fully assembled with illustrated instructions for implementing the various options and complete satisfaction is guaranteed....\$24.95

DUPLICATE SYSTEM TAPES WITH "CLONE"

This machine language program makes duplicate copies of ANY tape written for Level II. They may be SYSTEM tapes (continuous or not) or data lists. It is not necessary to know the file name or where it loads in memory, and there is no chance of system co-residency. The file name, entry point, and every byte (in ASCII format) are displayed on the video screen. Data may be modified before copy is produced. CLONE....\$16.95

RAM TEST FOR LEVEL II

This machine language program tests memory chips for open or shorted address or data lines as well as intermittents. It tests each BIT for validity and each BYTE in the execution of an actual instruction as in real program execution. Bad addresses are displayed along with the bad data and proper data. One complete test of 48K takes just 14 seconds. Also includes a test for errors induced by power line glitches from external equipment. RAMTEST....\$9.95

PROGRAM INDEX FOR DISK BASIC

Assemble an alphabetized index of your entire program library from disk directories. Program names and free space are read automatically (need not be typed in) and may be alphabetized by disk or program. The list may also be searched for any disk, program, or extension; disks or programs added or deleted; and the whole list or any part sent to the printer. Finally, the list itself may be stored on disk for future access and update. One drive and 32K required. INDEX....\$19.95

EDIT BASIC PROGRAMS WITH ELECTRIC PENCIL

This program allows disk users to load Basic programs or any other ASCII data file into the disk version of Electric Pencil for editing. Now you can edit line numbers, move program segments, duplicate program segments, and search for the occurrence of any group of characters. PENPATCH....\$9.95

SPOOLER FOR PARALLEL PRINTERS

✓ 144

This program is a full feature print formatting package featuring user definable line and page length (with line feeds inserted between words or after punctuation), screen dump, keyboard debounce, and printer pause control. In addition, printing is done from a 4K buffer area so that the LPRINT or LLIST command returns control to the user while printing is being done. Ideal for Electric or other slow printers. Allows printing and processing to run concurrently. SPOOLER....\$16.95



Include 75¢ postage. California residents add 6% sales tax.
Complete satisfaction or full refund.



MUMFORD MICRO SYSTEMS

BOX 435-E Summerland, California 93067 (805) 969-4557

Field	Length	Attribute	Variable Name
LAST NAME	15	String	LNS
FIRST NAME	15	String	NFS
MIDDLE INITIAL	1	String	MIS
JOB TITLE	20	String	TS
BUSINESS			
STREET	20	String	BSS
CITY	15	String	BCS
STATE, ZIP CODES	8	String	BZS
PHONE	7	String	BPS
HOME			
STREET	20	String	HSS
CITY	15	String	HCS
STATE, ZIP CODES	8	String	HZS
PHONE	7	String	HPS
MAIL TO:	1	Single Precision	MT
1 HOME			
2 OFFICE			
MEMBERSHIP	1	Single Precision	M
1 LOCAL ONLY			
2 NATIONAL ONLY			
3 NATIONAL & LOCAL			
MEMBERSHIP #	7	String	MNS
(National only)			
MEMBERSHIP START	6	Single Precision	MS
DATE (MMDDYY)			
MEMBERSHIP	6	Single Precision	ME
Expiration			
DATE (MMDDYY)			
OFFICE HELD	1	Single Precision	OH
1. President			
2. Vice president			
3. Secretary			
4. Treasurer			
5. Committee Chairperson			
6. None			
COMMITTEE ASSIGNMENTS	1	Single Precision	CA
1. Program			
2. Site Representative			
3. Professional Development			
4. Membership			
5. None			

Table 2.

inction between physical and logical records of a file.

It then became obvious to some that we had used sequential file techniques in the previous two sessions with our tapes, and they asked, "How similar are tape and disk sequential files?"

Indeed, they are very similar, and we carried this point home by showing how to modify the existing programs of the tape creation of a sequential file (TCSF) and the tape update of a sequential file (TUSF).

Since we must load our programs from tape into the TRS-80 under control of DISK BASIC, we first acquainted the participants with CMD "T" and CMD "R". Once loaded, TCSF was modified to a disk creation of a sequential file (DCSF), changing lines 10, 150, 180 and 190. The DCSF program is shown in Listing 5.

Modifications to TUSF were a little more complicated because they also involved a change in program logic. In TUSF, we used a dummy record to indicate the

end of our file; however, in DISK BASIC under a sequential file access we can use the end of file indicator (EOF) and eliminate the dummy record.

Again, we used the flowcharts in Figs. 2 and 3 to compare and contrast TUSF and DUSF. The DUSF program is shown in Listing 6. The lines modified were 10, 20, 50, 60, 80, 90, 190, 1200, 1300 and 1460. So ended the third session. We had covered a lot, but there was so much yet to go over.

The Fourth Session

We upgraded our hardware for the final time in the fourth session by adding one more minifloppy drive. For the last two sessions we wanted to concentrate on random access techniques and the development of a software system.

Random access offered several advantages over the sequential techniques we just finished. For one thing, instead of having to read from the beginning of a file, we could read a specific record directly. Further-

more, the data was not stored in ASCII but compressed so that it could be read and written faster and take less space on the diskette.

Like the sequential file, we had to use the OPEN and CLOSE instructions to manipulate our buffers; however, we no longer had to think of one logical record being a physical record. In fact, more than one logical record went into a physical record.

We introduced the idea of subrecords and the blocking of these subrecords into a physical record via the use of the FIELD instruction. To get data in and out of the buffer we called on the intrinsic functions of DISK BASIC—LSET, RSET, MKI\$, MKS\$, MKD\$, CVI, CVS, CDV.

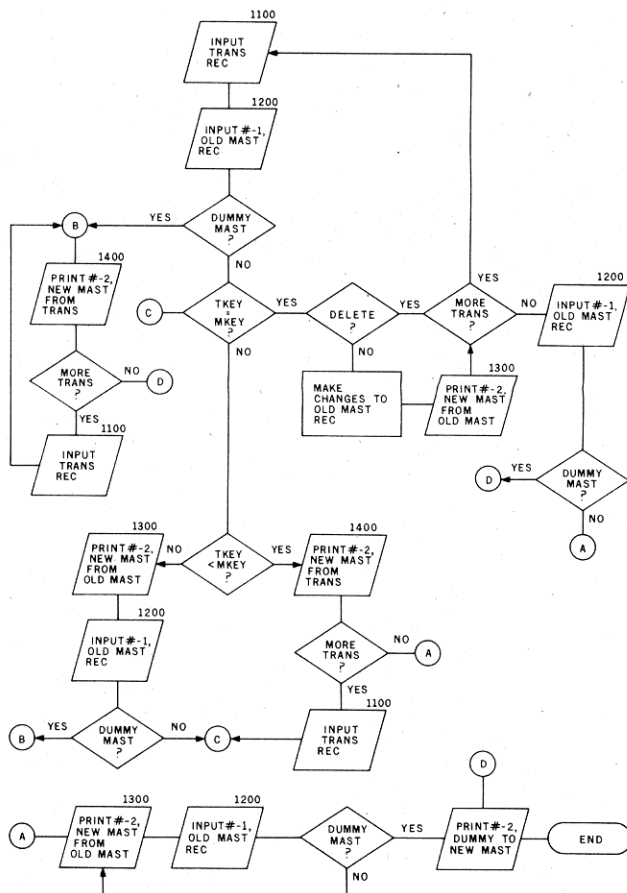
There was a great deal of confusion and discussion about these topics, so some simple examples were given to assist in setting up buffered fields. To get

the records in and out of a random file, we explained the use of the GET and PUT instructions.

The scenario for the last two sessions allowed us to develop a software system complicated enough to challenge all the participants, yet familiar enough for them to feel comfortable with the application.

Suppose a bookkeeper for a high school used the accounts found in Table 3. Each month the bookkeeper posted no more than 50 checks or receipts on these accounts. These transactions were filed for possible future reference in a ledger book, and a total for each account was maintained on an account summary sheet (see Table 4). Each entry in the transaction file consisted of an account number, a description, the date of the transaction, the receipt or check number and the amount of the transaction.

"What kind of software is involved in a system like this?"



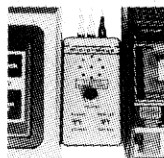
for the TRS-80 from Micro-Mega

CASSETTE CONTROL UNIT

• Speed up your cassette tape handling • Pinpoint program locations on tape with an audible monitor • Get protection from recording and playback glitches resulting from ground loops • Eliminate the tedious plugging and unplugging of recorder cables

The Micro-Mega Cassette Control Unit does all this and more. You get instant manual control of the recorder at the flick of a switch. Want to find the beginning or end of a program? Flick another switch and you'll hear it. All cables remain plugged in all the time.

The Micro-Mega Cassette Control Unit does a lot to improve the appearance of your TRS-80 system, too. As shown, it's in a 2 1/2" x 5" box which snuggles between the keyboard and your recorder. There is no need to move the recorder, and all cables come neatly into the unit. The Cassette Control Unit is tailored to the CTR-41 recorder, but may be used with most other recorders as well.

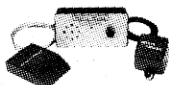


CASSETTE CONTROL UNIT.....\$37.95
Add \$1.00 for postage and handling

CPU MONITOR

Ever find yourself with a blank screen wondering what your computer is up to? The Micro-Mega CPU Monitor can tell you, for example: • If your CPU is in a loop with no exit, • When a long sort is nearing completion, or • If a key bounces during keyboard input. The CPU Monitor lets you listen to all CSAVES and CLOADS and will help you quickly find the correct recorder volume setting. If you have an expansion interface, you will always know whether the real-time clock is on or off because you can hear it.

The Micro-Mega CPU Monitor gives a voice to the Z-80 microprocessor in your TRS-80 by using AM radio circuitry to pick up the computational rhythms of the CPU, which are amplified and played through a loudspeaker. The pickup unit of the CPU Monitor, shown at left in the photo, goes under your TRS-80 keyboard. It is connected by a 36" cable to the speaker and control unit, which includes an on/off volume control and an LED "power-on" indicator. The Monitor is powered by an AC adapter, shown at right in the photo. No batteries are needed and no electrical connections to your TRS-80 are required.



By listening to the CPU Monitor, you will soon become familiar with the "personalities" of the programs you run and whether they are executing in a normal way. A dramatic use of the CPU Monitor is in the great enhancement which it provides for computer games. (See "Gaming Environment" below.)

CPU MONITOR.....\$47.95
Add \$2.00 for postage and handling

THE GREEN-SCREEN

The eye-pleasing Green-Screen fits over the CRT of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright, luminous green characters and graphics like those featured by very expensive CRT units.

The Green-Screen is closely matched to the color and texture of the TRS-80 Video Display and improves the overall appearance of your system. It is attached with adhesive strips, which do not mar your display unit in any way. The Micro-Mega Green-Screen gives improved video display visibility for all applications and is especially effective in creating dramatic, high-impact displays for computer games. (See "Gaming Environment" below.)

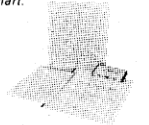


THE GREEN-SCREEN.....\$13.95
Add \$1.00 for postage and handling

THE ULTIMATE STAR TREK PACKAGE

Tired of trivial computer games? This complete Star Trek package will provide you with endless fascination and challenge. In addition to the program cassette, it includes comprehensive instructions, a pad of "Voyage Log" record sheets, and a free-standing "Torpedo and Maneuvering Chart."

The package is built around the latest version of Lance Micklus' incomparable Star Trek III, a 13,000 byte program with a host of subtle and imaginative features, which include numerous dynamic and spectacular graphic displays. Star Trek III puts you in command of the Enterprise cruising in a galaxy of 192 quadrants filled with uncharted hazards, including hostile Klingons, pulsars, and black holes. You have at your disposal scanners, various weapons and defense systems, on-board computers, and a loyal crew. (You will need them all to survive the Klingons.)



Your mission is to rid the region of Klingons and to locate five inhabitable planets, all within 300 star days, before returning to Star Fleet Headquarters, where your overall effectiveness as a starship commander will be scored. High scores are possible only with careful planning and effective battle tactics. The "Voyage Log" sheets will guide your strategy, and the "Torpedo and Maneuvering Chart" will give you a vital edge in combat. (When you engage three Klingon ships you can't afford to miss.)

STAR TREK PACKAGE (for Level II, 16K only).....\$22.95
Add \$1.00 for postage and handling

CREATE YOUR OWN SPECTACULAR GAMING ENVIRONMENT (and save \$5.00)

The Enterprise is in battle trim with deflector shields at full power. As her captain, you are taking her into combat. The battle stations siren rings in your ears and "CONDITION RED" flashes on your monitor screen. You call for warp drive and key in the coordinates of the quadrant where your scanners have detected Klingon ships. As you select the warp factor, you hear the reassuring clicking of your navigational gear as it activates the warp drive.

Suddenly, you break out of hyperspace and your monitor displays the chilling sight of three Klingon Battle Cruisers floating on your screen! Their evil shapes glow in luminous green against the black void of space. Moments later, you hear the characteristic rasping sound of Klingon laser weapons, and, as you watch, high-energy beams come knitting toward the Enterprise in succession from each of the Klingon ships.

You have been hit! You hear the dismal sound of the damage control alarm as "DAMAGE TO WARP DRIVE" and "DAMAGE TO PHASERS" flash on your screen. The Klingons have stopped firing! The Enterprise is crippled, but your best weapon is still intact, and it's your turn now! You key in the command for photon torpedoes. As your screen again displays the position of the Klingon ships, you select a firing vector from your torpedo chart and key it in. Now you hear the buzz of your photon torpedo as you see it speeding toward a Klingon ship. It strikes him dead-center! As you watch, the Klingon Battle Cruiser disintegrates, accompanied by a satisfying crackling sound.

Does the above scenario sound far-fetched? Not at all. It's a small sample of what you will experience with Micro-Mega's Gaming Environment, which consists of: • The STAR TREK PACKAGE • The GREEN-SCREEN and • The CPU MONITOR. The fast paced and dynamic action reflects the superb Star Trek III program together with the "Voyage Log" and "Torpedo Chart" of the Star Trek Package. All of the unique graphic displays are greatly enhanced by the Green-Screen. Finally, the uncanny sound effects are produced by the CPU Monitor, which faithfully picks up the FOR, NEXT loops and other CPU patterns, which create the distinctive siren sounds that accompany the ALERT and DAMAGE messages along with the harsher notes of the weapons salvos. Once you've tried it, you won't any longer be satisfied with silent computer games.

Remember that with the Gaming Environment you also get all of the other excellent features of the CPU Monitor and the Green-Screen for non-gaming applications. You also save \$5.00 off the combined cost of the individual items.

GAMING ENVIRONMENT.....\$79.85
Add \$3.50 for postage and handling

Terms: Check or money order, no CODs or credit cards, please. Add amount shown for postage and handling to price of the item. All items shipped within 48 hours by first class or priority mail. Virginia residents, add 4% sales tax.

✓29

Micro-Mega • P.O. Box 6265 • Arlington, Va 22206

Income

110 Activities
120 Annual trips
130 State Funds
140 Fund Raising
151 Savings Account Interest
152 Savings Certificates
161 Maintenance
162 Catering
163 Music
171 Sports Donations
172 Sports Fees
173 Sports Tournaments
174 Sports Uniforms
180 Yearly Dues
190 Insurance
200 General Donations
210 Miscellaneous

Disbursements

311 Monthly Activities
312 Meeting Activities
313 Other Activities
320 Annual Trips
330 State Contributions
340 Fund Raising
351 Trip Savings
352 Maintenance Savings
353 General Savings
354 Special Savings
355 Interest Savings
356 Designated Savings
361 Maintenance Service
362 Music Service
363 Insurance Service
364 Service General
371 Sports Equipment
372 Sports Entrance Fees
373 Sports Trophies
374 Sports Uniform
375 Sports Other
381 Printing and Supplies
382 Postage
390 Petty Cash
400 Academic Grants
410 Miscellaneous

Table 3.

someone asked.

Since the transactions are accomplished monthly, we suggested keeping one file for each month, calling them JAN, FEB, MAR... DEC. The account summary sheet was handled as a separate file called FMASTER. The programs that manipulated

these files were:

INIT—used to initialize FMASTER.

UPDATE—used to post the monthly transactions to FMASTER and create the monthly transaction file for later review.

REVIEWM—used to allow the principal to review any account.

REVIEWT—used to allow the principal to review any month's transactions.

Since we had two minifloppy drives, we elected to keep all system software on DRIVE 0, while all the data files were kept on DRIVE 1. We used FORMAT to initial the data diskette in DRIVE 1. The FMASTER file was created in the INIT program Listing 7.

Since only 90 bytes were needed for each account (logical record), two subrecords could be contained in each physical record (256 byte sector). For each account, the totals for all the months, the four quarters and the year-to-date were initialized to zero in INIT.

The UPDATE program found in Listing 8 was designed to manipulate FMASTER and create a monthly transaction file. We decided on the familiar strategy of accepting into memory all the transactions before putting them in ascending order via account numbers.

An exchange sort was taught and implemented in lines 1000-1110 of UPDATE. Since each transaction record needed only 40 bytes of storage, six subrecords were put into each physical record. A dummy record was used to indicate the

Account Number XXX

JAN XXXX.XX	
FEB XXXX.XX	
MAR XXXX.XX	FIRST QUARTER XXXX.XX
APR XXXX.XX	
MAY XXXX.XX	
JUN XXXX.XX	SECOND QUARTER XXXX.XX
JUL XXXX.XX	
AUG XXXX.XX	
SEP XXXX.XX	THIRD QUARTER XXXX.XX
OCT XXXX.XX	
NOV XXXX.XX	
DEC XXXX.XX	FOURTH QUARTER XXXX.XX
	YEAR TO DATE XXXX.XX

Table 4.

last record in the file. As an afterthought, a choice of a printed copy of the transaction file was given.

The Final Session

The last evening was spent writing the programs to review the master file (Listing 9) and reviewing the transaction files (Listing 10). The REVIEWM program produced the form found in Table 3 on the video screen.

In REVIEWT, the operator again used hard copy. Thus, we completed our general ledger software and another continu-

ing education program.

To date, an evaluation of our continuing education programs with the TRS-80 by the participants has indicated some future needs in the community. For example, the time is ripe for a course in TRS-80 Assembly Language Programming.

Also, the problem of adding and deleting records from a random file needs to be addressed.

When someone has completed the beginners and nonbeginners courses, we feel that short special topic courses are now feasible. ■

```

320 PRINT"COST AND DATE:";C(NI);D(NI)
330 PRINT"QUANTITY ON HAND:";Q(NI);PRINT"REORDER POINT:";R(NI);
PRINT"DISCOUNT INFORMATION:";DIS(NI)
340 PRINT:PRINT:INPUT"DO YOU WISH TO DELETE";QS
350 IF QS<>"YES" THEN GOTO 100
360 IF N=N1 THEN N=N-1:GOTO 100
370 IS(NI)=IS(N):DS(NI)=DS(N):C(NI)=C(N):D(NI)=D(N):Q(NI)=Q(N)
:R(NI)=R(N):DIS(NI)=DIS(N):N=N-1:GOTO 100
400 N=N+1:CLS:INPUT"WHAT IS THE ITEM #";IS(N):PRINT:INPUT"WHAT
IS THE DESCRIPTION";DS(N)
410 PRINT:INPUT"WHAT IS THE UNIT COST";C(N)
420 PRINT:INPUT"WHAT IS THE DATE (MMDDYY)";D(N)
430 PRINT:INPUT"WHAT IS THE QUANTITY ON HAND";Q(N)
440 PRINT:INPUT"WHAT IS THE REORDER POINT";R(N)
450 PRINT:INPUT"WHAT IS THE DISCOUNT INFORMATION";DIS(N)
460 GOTO 100
500 CLS:INPUT"WHAT IS THE ITEM #";IS:GOSUB 700
510 CLS:PRINT"ITEM #";IS(NI)
520 PRINT:PRINT"DESCRIPTION:";DS(NI)
530 PRINT:PRINT"COST AND DATE:";C(NI);D(NI)
540 PRINT:PRINT"QUANTITY ON HAND:";Q(NI)
550 PRINT:PRINT"REORDER POINT:";R(NI)
560 PRINT:PRINT"DISCOUNT INFORMATION:";DIS(NI)
570 PRINT:PRINT:INPUT"DO YOU WISH TO CONTINUE REVIEWING INVENT
ORY";QS
580 IF QS="YES" THEN GOTO 500
590 GOTO 100
600 CLS:PRINT"PLACE CLEAN TAPE INTO RECORDER -- PRESS PLAY AND
RECORD"
610 INPUT"HIT <ENTER> TO CONTINUE";QS
630 CLS:PRINT @ 448, CHR$(23);"*** WRITING NEW MASTER FILE ***
"
640 FOR NI=1 TO N
650 PRINT#-1,IS(NI),C(NI),D(NI),DS(NI),Q(NI),R(NI),DIS(NI)
660 NEXT NI
670 PRINT#-1,"ZZZZZ",0,0,"DUMMY",0,0,"NONE"
680 CLS:PRINT TAB(20)"REORDER REPORT:"
681 PRINT"ITEM #";TAB(10)"QTY ON HAND";TAB(25)"R-PT";TAB(35)"D
DESCRIPTION"
682 FOR NI=1 TO N
683 IF Q(NI)<=R(NI) THEN PRINT IS(NI);TAB(14)Q(NI);TAB(25)R(NI
);TAB(35)DS(NI)
684 NEXT NI
690 END
700 FOR NI=1 TO N
710 IF IS = IS(NI) RETURN
720 NEXT NI
730 PRINT"INVALID ITEM # -- PLEASE CHECK YOUR DATA"
740 FOR NN=1 TO 5000:NEXT NN
750 GOTO 100

```

Program Listing 2.

```

1 ' ***** TAPE CREATION OF A SEQUENTIAL FILE *****
2 ' PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
3 ' PROGRAM-ID ==> TCSF LAST MODIFIED ==> MAY 29, 1979
10 CLEAR 300:CLS:PRINT"PLACE CLEAN DATA TAPE INTO RECORDER --
PRESS PLAY AND RECORD":INPUT"HIT <ENTER> TO CONTINUE";QS
20 CLS:INPUT"LAST NAME";LN$:INPUT"FIRST NAME";FN$:INPUT"MIDDL
E INITIAL";MIS$:INPUT"JOB TITLE";TS
30 INPUT"BUSINESS STREET ADDRESS";BS$:INPUT"BUSINESS CITY";BC
$:INPUT"BUSINESS STATE AND ZIP";BZ$:INPUT"BUSINESS PHONE";BP
$
40 INPUT"HOME STREET ADDRESS";HSS$:INPUT"HOME CITY";HCS$:INPUT"
HOME STATE AND ZIP";HHS$:INPUT"HOME PHONE";HPS$
50 PRINT"SEND CORRESPONDENCE TO:";TAB(25)"1" HOME ADDRESS":PR
INT TAB(25)"2" BUSINESS ADDRESS:INPUT"CHOICE";MT
60 IF (MT<>1) AND (MT<>2) THEN GOSUB 1000:GOTO 50
70 MN=0:MS=0:ME=0:PRINT"MEMBERSHIP STATUS";TAB(25)"1" LOCAL O
NLY":PRINT TAB(25)"2" NATIONAL ONLY":PRINT TAB(25)"3" NATION
AL AND LOCAL:INPUT"CHOICE";M
80 IF (M<>1) AND (M<>2) AND (M<>3) THEN GOSUB 1000:GOTO 70
90 IF (M=2) OR (M=3) INPUT"MEMBERSHIP #";MN
100 IF (M=1) OR (M=3) INPUT"LOCAL MEMBERSHIP START DATE (MMDD
YY)";MS:INPUT"LOCAL MEMBERSHIP EXPIRATION DATE";ME
110 PRINT"OFFICE HELD:";TAB(25)"1" PRESIDENT:PRINT TAB(25)"2"
VICE PRESIDENT:PRINT TAB(25)"3" SECRETARY:PRINT TAB(25)"4"
> TREASURER:PRINT TAB(25)"5" COMMITTEE CHAIRPERSON:PRINT T
AB(25)"6" NONE:INPUT"CHOICE";OH
120 IF (OH<>1) AND (OH<>2) AND (OH<>3) AND (OH<>4) AND (OH<>5)
AND (OH<>6) THEN GOSUB 1000:GOTO 110
130 PRINT"COMMITTEE ASSIGNMENT:";TAB(25)"1" PROGRAM:PRINT TAB
(25)"2" SITE REPRESENTATIVE:PRINT TAB(25)"3" PROFESSIONAL D
EVELOPMENT:PRINT TAB(25)"4" MEMBERSHIP:PRINT TAB(25)"5" NO
NE:INPUT"CHOICE";CA
140 IF (CA<>1) AND (CA<>2) AND (CA<>3) AND (CA<>4) AND (CA<>5)
THEN GOSUB 1000:GOTO 130
150 PRINT#-1, LN$,FN$,MIS$,TS,BSS$,BC$,BZ$,BPS$,HSS$,HCS$,HHS$,M
T,MN,MN,MS,ME,OH,CA
160 PRINT:INPUT "ARE THERE MORE MEMBERS";QS:IF QS="YES" THEN G
OTO 20
170 IF QS<>"NO" THEN GOSUB 1000:GOTO 160
180 PRINT#-1,"ZZZZZ",MIS$,TS,BSS$,BC$,BZ$,BPS$,HSS$,HCS$,HHS$,H
Z$,HPS$,MT,MN,MN,MS,ME,OH,CA
190 CLS:PRINT"END OF PROGRAM: TCSF":PRINT:PRINT"REMOVE DATA TA
PE FROM RECORDER":PRINT:PRINT"END
1000 PRINT"***** INVALID RESPONSE -- PLEASE CHECK YOUR ANSWER":
RETURN

```

Program Listing 3.

```

1 ' ***** TAPE UPDATE OF A SEQUENTIAL FILE *****
2 ' PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
3 ' PROGRAM-ID ==> TUSF LAST MODIFIED ==> MAY 31, 1979
10 CLEAR 600:CLS:PRINT"PLACE OLD MASTER TAPE INTO RECORDER #1":
PRINT"PRESS PLAY:PRINT:PRINT"PLACE CLEAN TAPE INTO RECORDER
#2":PRINT"PRESS PLAY AND RECORD (THIS WILL BE THE NEW MASTE
R TAPE)":PRINT:INPUT"HIT <ENTER> TO CONTINUE";QS

```

Program continues.

```

1 ' ***** CREATES INVENTORY MASTER FILE *****
2 ' PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
3 ' PROGRAM-ID ==> TCREINV LAST MODIFIED ==> MAY 29, 1979
10 CLEAR 100:CLS:PRINT"PLACE CLEAN TAPE INTO RECORDER --
PRESS PLAY AND RECORD"
11 INPUT"HIT <ENTER> TO CONTINUE";QS
20 CLS:INPUT"WHAT IS THE ITEM # (5 CHARACTERS MAX)";IS:PRINT
30 INPUT"WHAT IS THE DESCRIPTION (30 CHARACTERS MAX)";DS:PRIN
T
40 INPUT"WHAT IS THE COST PER ITEM (NUMERIC -- NO COMMAS OR $
)";C:PRINT
50 INPUT"WHAT IS THE DATE OF THIS PRICING (MMDDYY)";D:PRINT
60 INPUT"WHAT IS THE QUANTITY ON HAND";Q:PRINT
70 INPUT"WHAT IS THE REORDER POINT";R:PRINT
80 INPUT"WHAT IS THE DISCOUNT INFORMATION (30 CHARACTERS MAX)
";DIS:PRINT
90 CLS:PRINT @ 448, CHR$(23);"*** WRITING DATA TO TAPE ***":P
RINT#-1,IS,C,D,DS,Q,R,DIS:CLS
100 INPUT"ARE THERE MORE ITEMS";QS
101 IF QS="YES" THEN GOTO 20
102 IF QS="NO" THEN GOTO 110
103 PRINT"PLEASE ANSWER WITH A YES OR NO":GOTO 100
110 PRINT#-1,"ZZZZZ",0,0,"DUMMY",0,0,"NONE"
120 FOR J=1 TO 20:CLS:PRINT @ 448, CHR$(23); "REMOVE DATA TAPE F
ROM RECORDER":FOR N=1 TO 250:NEXT N:NEXT J: END

```

Program Listing 1.

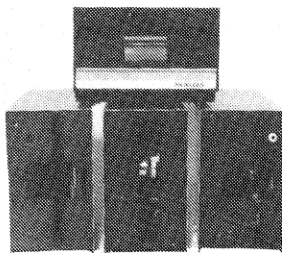
```

1 ' ***** UPDATE INVENTORY MASTER FILE *****
2 ' PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
3 ' PROGRAM-ID ==> TUPDINV LAST MODIFIED ==> MAY 29, 1979
10 CLEAR 7000:DIM IS(100),DS(100),C(100),D(100),Q(100),R(100)
,DIS(100):DEFINT N=N-1
20 CLS:PRINT CHR$(23);PRINT @ 448,"LOAD INVENTORY MASTER TAPE
":PRINT @512,"PRESS PLAY"
30 PRINT:PRINT:INPUT"HIT <ENTER> TO CONTINUE";QS
40 CLS:PRINT @ 448, CHR$(23);"*** READING OLD MASTER FILE ***
"
50 N=0
60 INPUT#-1,IS,C,D,DS,Q,R,DIS
70 IF IS="ZZZZZ" GOTO 100
80 N=N+1
90 IS(N)=IS(C(N)):C(D(N))=D(DS(N)):DS(Q(N))=Q(R(N)):R(DI$
(N))=DI$(G
OTO 60
100 CLS:PRINT CHR$(23);"DO YOU WISH TO:";PRINT"1>CHANGE INFORM
ATION":PRINT"2>DELETE AN ITEM FROM INVENTORY"
110 PRINT"3>ADD AN ITEM TO INVENTORY:PRINT"4>REVIEW THE STATU
S OF AN ITEM:PRINT"5>TERMINATE THE PROGRAM"
120 PRINT:PRINT:INPUT"WHAT IS YOUR CHOICE";NA
121 IF (NA=1) OR (NA=2) OR (NA=3) OR (NA=4) OR (NA=5) THEN GO
TO 130
122 PRINT"PLEASE ENTER A 1, 2, 3, 4, OR 5":GOTO 120
130 ON NA GOTO 200, 300, 400, 500, 600
200 CLS:PRINT"WHAT IS THE ITEM #";IS:GOSUB 700
210 CLS:PRINT"DO YOU WISH TO CHANGE:PRINT"1" ITEM # ";IS(NI)
:PRINT"2" DESCRIPTION:";DS(NI)
220 PRINT"3" COST AND DATE:";C(NI);D(NI)
230 PRINT"4" QUANTITY ON HAND:";Q(NI):PRINT"5" REORDER POINT:"
;R(NI):PRINT"6" DISCOUNT INFORMATION:";DIS(NI):PRINT"7" NOTH
ING ELSE"
240 PRINT:PRINT:INPUT"WHAT IS YOUR CHOICE";NA
241 IF (NA=1) OR (NA=2) OR (NA=3) OR (NA=4) OR (NA=5) OR (NA=6
) OR (NA=7) THEN GOTO 250
242 PRINT"PLEASE ENTER A 1, 2, 3, 4, 5, 6, OR 7":GOTO 240
250 ON NA GOTO 251,252,253,254,255,256,257
251 INPUT"WHAT IS THE NEW ITEM #";IS(NI):GOTO 210
252 INPUT"WHAT IS THE NEW DESCRIPTION (30 CHARACTERS MAX)";DS(
NI):GOTO 210
253 INPUT"WHAT IS THE NEW COST";C(NI):INPUT"WHAT IS THE DATE O
F THIS PRICING (MMDDYY)";D(NI):GOTO 210
254 Q=0:PRINT"TO DEplete INVENTORY BY 2 ITEMS ENTER -2":PRINT:
PRINT"TO REPLENISH INVENTORY BY 2 ITEMS ENTER 2":PRINT:INPUT
"WHAT IS THE TRANSACTION";Q:Q(NI)=Q(NI)+Q:GOTO 210
255 INPUT"WHAT IS THE NEW REORDER POINT";R(NI):GOTO 210
256 INPUT"WHAT IS THE NEW DISCOUNT INFORMATION";DIS(NI):GOTO 2
10
257 GOTO 100
300 CLS:INPUT"WHAT IS THE ITEM #";IS:GOSUB 700
310 CLS:PRINT"ITEM TO BE DELETED:";PRINT"ITEM # ";IS(NI):PRIN
T"DESCRIPTION:";DS(NI)

```

SAVE ON ADD-ON PRODUCTS FOR TRS-80

The largest family of disk drives from the largest supplier, drives come complete with power supply and cabinet.



MTI-40 Disk Drive, 35 & 40 track	\$369
TF-1 Perfec FD200, 40 track, use both sides	\$389
TF-3 Shugart SA400, 35 track, same as tandy	\$389
TF-5 MPI B51, 40 track	\$379
TF-70 Micropolis, 77 track with 195K of storage	\$639
TDH-1 Dual sided drive, 35 track	\$499

Max. Disk 2: 10 Megabyte (fixed)
Winchester Technology. **\$5349**

NEW PRODUCTS

16K Memory	\$86
Modem	\$179
Expansion Interface 32K	\$499
AC Isolator	\$47.95

PRINTERS

DP800 Anadex, 80 column, 112cps	\$949
LP779 Centronics 779	\$1099
LP730 Centronics 730	\$950
LP700 Centronics 700	\$1395
LP701 Centronics 701	\$1759
LP702 Centronics 702	\$1995
SPW-1 Spinwriter-NEC	\$2525

NEW! LINE PRINTER BASE 2

Base 2 Printer 80, 132 col., graphics
60 LPM with tractors

\$599

*** DRIVES FOR ANY MICROCOMPUTER ***
Does not include power supply & cabinet.

MOD II DISK DRIVES NOW AVAILABLE

Perfec FD200	\$282
Perfec FD250 (dual head)	\$399
Shugart SA400 (unused)	\$286
Shugart SA800	\$479
MPI B52	\$349
B51	\$279

SOFTWARE

Disk Drive Motor Speed Test	\$19.95
New DOS+ with over 200 modifications and corrections to TRS-DOS	\$99
New DOS+ 40 track	\$110
AJA Word Processor	\$75
AJA Business Program	\$250
Racet Infinite Basic	\$49.95
Disk Drive Alignment Program	\$109
Radix Data Base Program	\$99.95
Electric Pencil	\$150

ALL PRICES CASH DISCOUNTED. FREIGHT FOB/FACTORY



MICROCOMPUTER
TECHNOLOGY
INCORPORATED



Apparat, Inc.

3304 W. MacArthur
Santa Ana, CA 92704
(714) 979-9923

7310 E. Princeton Ave.
Denver, CO 80222
(303) 758-7275

```

20  GOSUB 1100:GOSUB 1200:IF LNS="ZZZZZ" THEN GOTO 300
30  IF LNS=N3$ AND NF$=N1$ AND M1$=N2$ THEN GOTO 100
40  IF N3$<LNS THEN GOTO 200
50  GOSUB 1300:GOSUB 1200
60  IF LNS="ZZZZZ" THEN GOTO 300 ELSE GOTO 30
80  GOSUB 1300:GOSUB 1200:IF LNS<>"ZZZZZ" THEN GOTO 80
90  LNS="ZZZZZ":NF$="DUMMY":GOSUB 1300:CLS:PRINT"END OF PROGRA
M: TUSE":END
100 CLS:INPUT"IS THIS A DELETION";QS:IF (QS<>"YES") AND (QS<>"
NO") THEN GOTO100
110 IF QS="YES" THEN GOTO 180
120 CLS:GOSUB 1000:PRINT"PRINT"DO YOU WISH TO CHANGE":PRINT TA
B(10)"1> JOB TITLE";TAB(30)"2> BUSINESS ADDRESS":PRINT TAB(1
0)"3> HOME ADDRESS";TAB(30)"MAILING ADDRESS":PRINT TAB(10)"5
> MEMBERSHIP STATUS";TAB(30)"6> MEMBERSHIP START DATE"
130 PRINT TAB(10)"7> MEMBERSHIP EXP DATE";TAB(30)"8> OFFICE HE
LD":PRINT TAB(10)"9> COMMITTEE ASSIGNMENT";TAB(30)"10> NOTHI
NG ELSE":PRINT:INPUT"CHOICE";Q
140 ON Q GOTO 151,152,153,154,155,156,157,158,159,160:GOTO 120
151 INPUT"NEW JOB TITLE";TS:GOTO120
152 INPUT"NEW BUSINESS STREET ADDRESS";BSS:INPUT"NEW BUSINESS
CITY";BCS:INPUT"NEW BUSINESS STATE CODE AND ZIP CODE";BZ$:IN
PUT"NEW BUSINESS PHONE";BP$:GOTO 120
153 INPUT"NEW HOME STREET ADDRESS";HSS:INPUT"NEW HOME CITY";HC
S:INPUT"NEW HOME STATE CODE AND ZIP CODE";HZ$:INPUT"NEW HOME
PHONE";HP$:GOTO 120
154 PRINT"SEND CORRESPONDENCE TO:";TAB(25)"1> HOME":PRINT TAB(
25)"2> OFFICE":INPUT"CHOICE";MT:IF (MT=1) OR (MT=2) THEN GOT
O 120 ELSE GOTO 154
155 PRINT"MEMBERSHIP STATUS";TAB(25)"1> LOCAL ONLY":PRINT TAB(
25)"2> NATIONAL ONLY":PRINT TAB(25)"3> NATIONAL AND LOCAL":I
NPUT"CHOICE";M:IF (M=2) OR (M=3) THEN INPUT"MEMBER #";MN:GOTO
120 ELSE GOTO 120
156 INPUT"MEMBERSHIP START DATE";MS:GOTO 120
157 INPUT"MEMBERSHIP EXPIRATION DATE";ME:GOTO 120
158 PRINT"OFFICE HELD:";TAB(25)"1> PRESIDENT";TAB(25)"2> VICE
PRESIDENT":PRINTTAB(25)"3> SECRETARY":PRINTTAB(25)"4> TREASU
RER":PRINTTAB(25)"5> COMMITTEE CHAIRPERSON":PRINTTAB(25)"6> N
ONE":INPUT"CHOICE";OH:IF (1<OH) AND (OH<=6) GOTO120ELSEGOTO158
159 PRINT"COMMITTEE ASSIGNMENTS";TAB(25)"1> PROGRAM":PRINTTAB(
25)"2> SITE REPRESENTATIVE":PRINTTAB(25)"3> PROFESSIONAL DEV
ELOPMENT":PRINTTAB(25)"4> MEMBERSHIP":PRINTTAB(25)"5> NONE":
INPUT"CHOICE";CA:IF (1<CA) AND (CA<=5) GOTO120ELSEGOTO159
160 GOSUB 1300:GOTO 183
180 CLS:GOSUB 1000:PRINT"DO YOU WISH TO DELETE THIS INFO
RMATION";QS:IF QS<>"YES" AND QS<>"NO" GOTO 180
182 IF QS="NO" GOTO 120
183 CLS:INPUT"MORE TRANSACTIONS";QS:IF QS<>"YES" AND QS<>"NO"
THEN GOTO 183
184 IF QS="YES" THEN GOTO 20
190 GOSUB 1200:IF LNS="ZZZZZ" THEN GOTO 90 ELSE GOTO 80
200 GOSUB 1400
210 CLS:"MORE TRANSACTIONS";QS:IF QS<>"YES" AND QS<>"NO" THEN
GOTO 210
220 IF QS="YES" GOSUB 1100: GOTO 30 ELSE GOTO 80
300 GOSUB 1400
310 CLS:INPUT"MORE TRANSACTIONS";QS:IF QS<>"YES" AND QS<>"NO"
THEN GOTO 310
320 IF QS="YES" THEN GOSUB 1100:GOTO 300 ELSE GOTO 90
1000 IF MT=1 THEN MT$="HOME" ELSE MT$="OFFICE":IF M=1 THEN M$="
LOCAL ONLY":GOTO 1020
1005 IF M=2 THEN M$="NATIONAL ONLY" ELSE M$="NATIONAL AND LOCA
L"
1010 IF OH=1 THEN OH$="PRESIDENT"
1015 IF OH=2 THEN OH$="VICE-PRESIDENT"
1020 IF OH=3 THEN OH$="SECRETARY"
1025 IF OH=4 THEN OH$="TREASURER"
1030 IF OH=5 THEN OH$="COMMITTEE CHAIRPERSON"
1035 IF OH=6 THEN OH$="NONE"
1040 IF CA=1 THEN CA$="PROGRAM"
1045 IF CA=2 THEN CA$="SITE REPRESENTATIVE"
1050 IF CA=3 THEN CA$="PROFESSIONAL DEVELOPMENT"
1055 IF CA=4 THEN CA$="MEMBERSHIP"
1060 IF CA=5 THEN CA$="NONE"
1065 CLS:PRINT NF$:M1$:LNS;TAB(40)M$:PRINTTS;TAB(40)"MEMBER #
";MN:PRINT BSS;TAB(40)"LOCAL START DATE:";MS
1075 PRINT BCS;";";BZ$:TAB(40)"LOCAL EXP DATE:";ME:PRINT BP$:
TAB(40)"OFFICE:";OH:PRINT HSS;TAB(40)"COMMITTEE:";CA$
1080 PRINT HCS;";";HZ$:TAB(40)"SEND MAIL TO:";MT$:PRINT HP$:P
RINT:RETURN
1100 CLS:INPUT"WHAT IS THE LAST NAME";N3$:INPUT"WHAT IS THE FIR
ST NAME";N1$:INPUT"WHAT IS THE MIDDLE INITIAL";N2$:RETURN
1200 INPUT#-1,LNS,NF$,M1$,TS,BSS,BCS,BZ$,BP$,HSS,HC$,HZ$,HP$,MT
,M,MN,MN,MS,ME,OH,CA:RETURN
1300 PRINT#-2,LNS,NF$,M1$,TS,BSS,BCS,BZ$,BP$,HSS,HC$,HZ$,HP$,MT
,M,MN,MS,ME,OH,CA:RETURN
1400 INPUT"JOB TITLE";T1$:INPUT"BUSINESS STREET ADDRESS";B1$:IN
PUT"BUSINESS CITY";B2$:INPUT"BUSINESS STATE AND ZIP";B3$:INP
UT"BUSINESS PHONE";B4$
1405 INPUT"HOME STREET ADDRESS";H1$:INPUT"HOME CITY";H2$:INPUT
HOME STATE AND ZIP";H3$:INPUT"HOME PHONE";H4$
1410 PRINT"SEND CORRESPONDENCE TO";TAB(25)"1> HOME ADDRESS":PRI
NT TAB(25)"2> BUSINESS ADDRESS":INPUT"CHOICE";M1
1415 IF (M1<>1) AND (M1<>2) THEN GOSUB 1500:GOTO 1410
1420 M3=0:M4=0:M5=0:PRINT"MEMBERSHIP STATUS";TAB(25)"1> LOCAL O
NLY":PRINT TAB(25)"2> NATIONAL ONLY":PRINT TAB(25)"3> NATION
AL AND LOCAL":INPUT"CHOICE";M2
1425 IF (M2<>1) AND (M2<>2) AND (M2<>3) THEN GOSUB 1500:GOTO 14
20
1430 IF (M2=2) OR (M2=3) INPUT"MEMBERSHIP #";M3
1435 IF (M2=1) OR (M2=3) INPUT"LOCAL MEMBERSHIP START DATE (MMD
DYY)";M4:INPUT"LOCAL MEMBERSHIP EXPIRATION DATE";M5
1440 PRINT"OFFICE HELD:";TAB(25)"1> PRESIDENT":PRINTTAB(25)"2>
VICE-PRESIDENT":PRINTTAB(25)"3> SECRETARY":PRINTTAB(25)"4>
TREASURER":PRINTTAB(25)"5> COMMITTEE CHAIRPERSON":PRINTTAB(2
5)"6> NONE":INPUT"CHOICE";OH
1445 IF (OH<1) OR (6<OH) GOSUB 1500:GOTO 1440
1450 PRINT"COMMITTEE ASSIGNMENNT:";TAB(25)"1> PROGRAM":PRINTTAB
(25)"2> SITE REPRESENTATIVE":PRINTTAB(25)"3> PROFESSIONAL DE
VELOPMENT":PRINTTAB(25)"4> MEMBERSHIP":PRINTTAB(25)"5> NONE"
:INPUT"CHOICE";AC
1455 IF (AC<1) OR (5<AC) THEN GOSUB 1500:GOTO 1450
1460 PRINT#-2,N3$,N1$,N2$,T1$,B1$,B2$,B3$,B4$,H1$,H2$,H3$,H4$,M
1,M2,M3,M4,M5,HO,AC:RETURN
1500 PRINT***** INVALID RESPONSE -- PLEASE CHECK *****:RETURN

```

Program Listing 4.


```

1  ' ***** DISK CREATION OF A SEQUENTIAL FILE *****
3  ' PROGRAM-ID ==> DCSF      LAST MODIFIED ==> MAY 29, 1979
10 CLEAR 300:CLS:INPUT"WHAT IS THE NAME OF THIS NEW MASTER FI
LE";F1$:OPEN "O",1,F1$
20 CLS:INPUT"LAST NAME";LN$:INPUT"FIRST NAME";NF$:INPUT"MIDDL
E INITIAL";MI$:INPUT"JOB TITLE";TS
30 INPUT"BUSINESS STREET ADDRESS";BS$:INPUT"BUSINESS CITY";BC
$:INPUT"BUSINESS STATE AND ZIP";BZ$:INPUT"BUSINESS PHONE";BP
$
40 INPUT"HOME STREET ADDRESS";HSS:INPUT"HOME CITY";HC$:INPUT"
HOME STATE AND ZIP";HZ$:INPUT"HOME PHONE";HPS
50 PRINT"SEND CORRESPONDENCE TO:";TAB(25)"1"> HOME ADDRESS":PR
INT TAB(25)"2"> BUSINESS ADDRESS":INPUT"CHOICE";MT
60 IF (MT<>1) AND (MT<>2) THEN GOSUB 1000:GOTO 50
70 MN=0:MS=0:ME=0:PRINT"MEMBERSHIP STATUS";TAB(25)"1"> LOCAL O
NLY":PRINT TAB(25)"2"> NATIONAL ONLY":PRINT TAB(25)"3"> NATION
AL AND LOCAL":INPUT"CHOICE";M
80 IF (M<>1) AND (M<>2) AND (M<>3) THEN GOSUB 1000:GOTO 70
90 IF (M=2) OR (M=3) INPUT"MEMBERSHIP #";MNS
100 IF (M=1) OR (M=3) INPUT"LOCAL MEMBERSHIP START DATE (MMDD
YY)";MS:INPUT"LOCAL MEMBERSHIP EXPIRATION DATE";ME
110 PRINT"OFFICE HELD:";TAB(25)"1"> PRESIDENT":PRINT TAB(25)"2">
VICE PRESIDENT":PRINT TAB(25)"3"> SECRETARY":PRINT TAB(25)"4">
TREASURER":PRINT TAB(25)"5"> COMMITTEE CHAIRPERSON":PRINT T
AB(25)"6"> NONE:INPUT"CHOICE";OH
120 IF (OH<>1) AND (OH<>2) AND (OH<>3) AND (OH<>4) AND (OH<>5)
AND (OH<>6) THEN GOSUB 1000:GOTO 110
130 PRINT"COMMITTEE ASSIGNMENT:";TAB(25)"1"> PROGRAM":PRINT TAB
(25)"2"> SITE REPRESENTATIVE":PRINT TAB(25)"3"> PROFESSIONAL D
EVELOPMENT":PRINT TAB(25)"4"> MEMBERSHIP":PRINT TAB(25)"5"> NO
NE:INPUT"CHOICE";CA
140 IF (CA<>1) AND (CA<>2) AND (CA<>3) AND (CA<>4) AND (CA<>5)
THEN GOSUB 1000:GOTO 130
150 PRINT#1, LN$,"";NF$,"";TS,"";BS$,"";BC$,"";BZ
$,"";BP$,"";HSS,"";HC$,"";HZ$,"";HPS,"";MT,"";M$,"";M
NS,"";MS,"";ME,"";OH,"";CA
160 PRINT:INPUT"ARE THERE MORE MEMBERS";QS:IF QS="YES" THEN G
OTO 20
170 IF QS<>"NO" THEN GOSUB 1000:GOTO 160
180 CLOSE 1
190 CLS:PRINT"END OF PROGRAM: DCSF":PRINT:PRINT:PRINT:PRINT:EN
D
1000 PRINT"***** INVALID RESPONSE -- PLEASE CHECK YOUR ANSWER":
RETURN

```

Program Listing 5.

```

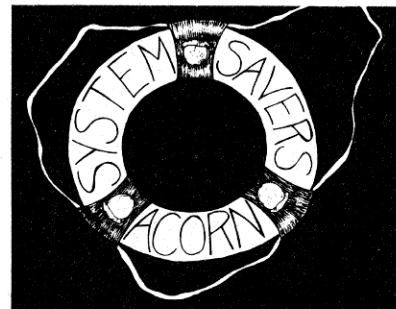
1  ' ***** DISK UPDATE OF A SEQUENTIAL FILE *****
3  ' PROGRAM-ID ==> DUSF      LAST MODIFIED ==> MAY 31, 1979
10 CLEAR 600:CLS:INPUT"WHAT IS THE NAME OF THE OLD MASTER FIL
E";F1$:INPUT"WHAT IS THE NAME FOR THE NEW MASTER FILE";F2$:O
PEN"1",1,F1$:OPEN"O",2,F2$
20 GOSUB 1100:IF EOF(1) THEN GOTO 300 ELSE GOSUB 1200
30 IF LN$=N3$ AND NF$=N1$ AND MI$=N2$ THEN GOTO 100
40 IF N3$=LN$ THEN GOTO 200
50 GOSUB 1300
60 IF EOF(1) THEN GOTO 300 ELSE GOSUB 1200:GOTO 30
80 GOSUB 1300:IF EOF(1) THEN GOTO 90 ELSE GOSUB 1200:GOTO 80
90 CLOSE 1:CLOSE 2:CLS:PRINT"END OF PROGRAM: DUSF":END
100 CLS:INPUT"IS THIS A DELETION";QS:IF (QS<>"YES") AND (QS<>"
NO") THEN GOTO100
110 IF QS="YES" THEN GOTO 180
120 CLS:GOSUB 1000:PRINT"DO YOU WISH TO CHANGE":PRINT TAB(10)"
1"> JOB TITLE";TAB(40)"2"> BUSINESS ADDRESS":PRINT TAB(10)"3">
HOME ADDRESS";TAB(40)"4"> MAILING ADDRESS":PRINT TAB(10)"5"> M
EMBERSHIP STATUS";TAB(40)"6"> MEMBERSHIP STRT DATE"
130 PRINT TAB(10)"7"> MEMBERSHIP EXP DATE";TAB(40)"8"> OFFICE HE
LD":PRINT TAB(10)"9"> COMMITTEE ASSIGNMENT";TAB(40)"10"> NOTHI
NG ELSE:INPUT"CHOICE";Q
140 ON Q GOTO 151,152,153,154,155,156,157,158,159,160:GOTO 120
151 INPUT"NEW JOB TITLE";TS:GOTO120
152 INPUT"NEW BUSINESS STREET ADDRESS";BS$:INPUT"NEW BUSINESS
CITY";BC$:INPUT"NEW BUSINESS STATE CODE AND ZIP CODE";BZ$:IN
PUT"NEW BUSINESS PHONE";BP$:GOTO 120
153 INPUT"NEW HOME STREET ADDRESS";HSS:INPUT"NEW HOME CITY";HC
$:INPUT"NEW HOME STATE CODE AND ZIP CODE";HZ$:INPUT"NEW HOME
PHONE";HPS:GOTO 120
154 PRINT"SEND CORRESPONDENCE TO:";TAB(25)"1"> HOME":PRINT TAB(
25)"2"> OFFICE:INPUT"CHOICE";MT:IF (MT=1) OR (MT=2) THEN GOT
O 120 ELSE GOTO 154
155 PRINT"MEMBERSHIP STATUS";TAB(25)"1"> LOCAL ONLY":PRINT TAB(
25)"2"> NATIONAL ONLY:PRINT TAB(25)"3"> NATIONAL AND LOCAL":I
NPUT"CHOICE";M:IF (M=2) OR (M=3) THEN INPUT"MEMBER #";MNS:GOT
O 120 ELSE GOTO120
156 INPUT"MEMBERSHIP START DATE";MS:GOTO 120
157 INPUT"MEMBERSHIP EXPIRATION DATE";ME:GOTO 120
158 PRINT"OFFICE HELD:";TAB(25)"1"> PRESIDENT";TAB(25)"2"> VICE
PRESIDENT":PRINTTAB(25)"3"> SECRETARY":PRINTTAB(25)"4"> TREASU
RER":PRINTTAB(25)"5"> COMMITTEE CHAIRPERSON":PRINTTAB(25)"6"> N
ONE":INPUT"CHOICE";OH:IF (1<=OH) AND (OH<=6) GOTO120ELSEGOTO158
159 PRINT"COMMITTEE ASSIGNMENTS";TAB(25)"1"> PROGRAM:PRINTTAB(
25)"2"> SITE REPRESENTATIVE":PRINTTAB(25)"3"> PROFESSIONAL DEV
ELOPMENT":PRINTTAB(25)"4"> MEMBERSHIP:PRINTTAB(25)"5"> NONE:
INPUT"CHOICE";CA:IF (1<=CA) AND (CA<=5) GOTO120ELSEGOTO159
160 GOSUB 1300:GOTO 183
180 CLS:GOSUB 1000:PRINT:INPUT"DO YOU WISH TO DELETE THIS INFO
RMATION";QS:IF QS<>"YES" AND QS<>"NO" THEN GOTO 180
182 IF QS="NO" GOTO 120
183 CLS:INPUT"MORE TRANSACTIONS";QS:IF QS<>"YES" AND QS<>"NO"
THEN GOTO 183
184 IF QS="YES" LOC GOTO 20
190 IF EOF(1) THEN GOTO 90 ELSE GOSUB 1200:GOTO 80
200 GOSUB 1400
210 CLS:INPUT"MORE TRANSACTIONS";QS:IF QS<>"YES" AND QS<>"NO"
THEN GOTO 210
220 IF QS="YES" GOSUB 1100:GOTO 30 ELSE GOTO 80
300 GOSUB 1400
310 CLS:INPUT"MORE TRANSACTIONS";QGET:IF QS<>"YES" AND QS<>"NO"
THEN IF 310
320 IF QS="YES" THEN GOSUB 1100:GOTO 300 ELSE GOTO 90
1000 IF MT=1 THEN MT$="HOME" ELSE MT$="OFFICE":IF M=1 THEN MS="

```

Program continues.

WITH
TAPE OR DISK

Complete your TRS-80*
with these routines not
found in either Level II or DOS.



SYSTEM SAVERS

by
Tom Stibolt

If you ever use the SYSTEM command, you can use this two program package. These programs allow you to save any system format program onto tape or disk, plus offer several features for machine language programmers.

With FLEXL, which is one of the two programs, you can make back-up copies of any system format tape. Most often a cassette that you make will load easier than an original. Plus you can find the filename on any system tape because it is displayed on the screen.

Disk drive owners can use TDISK to save any system format tape onto disk. "Air Raid", "Editor/Assembler" and other programs cannot normally be loaded to disk. Now TDISK allows you to save these programs onto disk. After DOS READY you will be able to simply type the filename and be up and running. It even loads non-contiguous tapes. TDISK will greatly increase the benefit of owning a disk drive.

Acorn produces several other utility programs for the TRS-80. These include "Aterm" and "Numbering" by Tom Stibolt; and "Disassembler", "Tape Utility" and "Disk Utility" by Roy Soltoff. All are available for less than \$20.00. Ask for these and other quality Acorn programs at your local computer store.

* TRS-80 is a trademark of Tandy Corp.



DEALER INQUIRIES INVITED.

Acorn ✓₃₄
Software Products, Inc.

634 North Carolina Avenue, S.E., Washington, D.C. 20003

```

LOCAL ONLY:GOTO 1020
1005 IF M=2 THEN M$="NATIONAL ONLY" ELSE M$="NATIONAL AND LOCA
1010 L"
1010 IF OH=1 THEN OH$="PRESIDENT"
1015 IF OH=2 THEN OH$="VICE-PRESIDENT"
1020 IF OH=3 THEN OH$="SECRETARY"
1025 IF OH=4 THEN OH$="TREASURER"
1030 IF OH=5 THEN OH$="CHAIRPERSON"
1035 IF OH=6 THEN OH$="NONE"
1040 IF CA=1 THEN CA$="PROGRAM"
1045 IF CA=2 THEN CA$="SITE REPRESENTATIVE"
1050 IF CA=3 THEN CA$="PROFESSIONAL DEVELOPMENT"
1055 IF CA=4 THEN CA$="MEMBERSHIP"
1060 IF CA=5 THEN CA$="NONE"
1065 CLS:PRINT N$;" ";M$;" ";LN$;TAB(35)M$:PRINT$;TAB(35)"ME
MBER #:";MNS:PRINT B$;TAB(35)"START DATE:";MS
1075 PRINT BC$;" ";BZ$;TAB(35)"EXP DATE:";ME:PRINT BP$;TAB(35)
"OFFICE:";OH$;PRINT HS$;TAB(35)"COMMITTEE:";CA$
1080 PRINT HC$;" ";HZ$;TAB(35)"SEND MAIL TO:";MT$;PRINT HP$;R
ETURN
1100 CLS:INPUT"WHAT IS THE LAST NAME";N3$:INPUT"WHAT IS THE FIR
ST NAME";N1$:INPUT"WHAT IS THE MIDDLE INITIAL";N2$:RETURN
1200 INPUT#1,LN$,N1$,N2$,B$,BZ$,BP$,HS$,HC$,HZ$,HP$,MT$,
M,MNS,MS,ME,OH,CA:RETURN
1300 PRINT#2,LN$;" ";N1$;" ";N2$;" ";B$;" ";BZ$;" ";B$;
";BP$;" ";HS$;" ";HC$;" ";HZ$;" ";HP$;" ";MT$;" ";M$;" ";MN
$;" ";MS$;" ";ME$;" ";OH$;" ";CA:RETURN
1400 INPUT"JOB TITLE";T1$:INPUT"BUSINESS STREET ADDRESS";B1$:IN
PUT"BUSINESS CITY";B2$:INPUT"BUSINESS STATE AND ZIP";B3$:INP
UT"BUSINESS PHONE";B4$
1405 INPUT"HOME STREET ADDRESS";H1$:INPUT"HOME CITY";H2$:INPUT
"HOME STATE AND ZIP";H3$:INPUT"HOME PHONE";H4$
1410 PRINT"SEND CORRESPONDENCE TO";TAB(25)"1" HOME ADDRESS":PRI
NT TAB(25)"2" BUSINESS ADDRESS":INPUT"CHOICE";M1
1415 IF (M1<1) AND (M1<2) THEN GOSUB 1500:GOTO 1410
1420 M3=0:M4=0:M5=0:PRINT"MEMBERSHIP STATUS";TAB(25)"1" LOCAL O
NLY:PRINT TAB(25)"2" NATIONAL ONLY:PRINT TAB(25)"3" NATION
AL AND LOCAL:INPUT"CHOICE";M2
1425 IF (M2<1) AND (M2<2) AND (M2<3) THEN GOSUB 1500:GOTO 14
20
1430 IF (M2=2) OR (M2=3) INPUT"MEMBERSHIP #";M3$
1435 IF (M2=1) OR (M2=3) INPUT"LOCAL MEMBERSHIP START DATE (MMD
DY)";M4:INPUT"LOCAL MEMBERSHIP EXPIRATION DATE";M5
1440 PRINT"OFFICE HELD:";TAB(25)"1" PRESIDENT:PRINTTAB(25)"2"
VICE-PRESIDENT:PRINTTAB(25)"3" SECRETARY:PRINTTAB(25)"4"
TREASURER:PRINTTAB(25)"5" COMMITTEE CHAIRPERSON:PRINTTAB(2
5)"6" NONE:INPUT"CHOICE";OH
1445 IF (OH<1) OR (OH<6) GOSUB 1500:GOTO 1440
1450 PRINT"COMMITTEE ASSIGNMENT:";TAB(25)"1" PROGRAM:PRINTTAB
(25)"2" SITE REPRESENTATIVE:PRINTTAB(25)"3" PROFESSIONAL DE
VELOPMENT:PRINTTAB(25)"4" MEMBERSHIP:PRINTTAB(25)"5" NONE"
:INPUT"CHOICE";AC
1455 IF (AC<1) OR (AC<5) THEN GOSUB 1500:GOTO 1450
1460 PRINT#2,N3$;" ";N1$;" ";N2$;" ";T1$;" ";B1$;" ";B2$;" ";B
3$;" ";B4$;" ";H1$;" ";H2$;" ";H3$;" ";H4$;" ";M1$;" ";M2$;"
";M3$;" ";M4$;" ";M5$;" ";HO$;" ";AC:RETURN
1500 PRINT"***** INVALID RESPONSE -- PLEASE CHECK *****":RETURN

```

Program Listing 6.

```

1 ' ***** INITIALIZATION OF FINANCIAL FILE *****
2 ' PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
3 ' PROGRAM-ID ==> INIT LAST MODIFIED ==> MAY 15, 1979
10 CLS:CLEAR 200:PRINT "THIS PROGRAM WILL CREATE ACCOUNTS":PR
INT"RECEIVABLE AND PAYABLE FOR A NEW YEAR"
20 PRINT "IF ACCOUNTING PROCEDURES HAVE CHANGED"
30 PRINT "YOU MAY WISH TO <BREAK> HERE AND EXAMINE THE"
40 PRINT "ACCOUNT NUMBERS -- PROGRAM LINE 900 ...."
50 INPUT "DO YOU WISH TO CREATE THE FMASTER FILE";QS
60 IF QS = "YES" GOTO 100
70 IF QS = "NO" GOTO 190
80 PRINT "PLEASE RESPOND WITH A YES OR NO":GOTO 50
100 CLS:PRINT "***** CREATING FINANCIAL FILE *****"
110 DEFINT A,I:DIM A(43):OPEN "R",1,"FMASTER:1"
120 FOR I = 1 TO 43
130 READ A(I)
140 AK = A(I)
160 PR% = INT((I-1)/2)+1
161 SR% = I-2*(PR%-1):GOSUB 400:GOSUB 500
162 PUT 1, PR%
170 NEXT I
180 CLOSE
190 CLS:PRINT"END OF INIT PROGRAM":END
400 FIELD 1, ((SR%-1)*90) AS STARTHERES,2ASAKS,4ASM1$,4ASM2$,4
ASM3$,4ASM4$,4ASM5$,4ASM6$,4ASM7$,4ASM8$,4ASM9$,4ASM0$,4ASMA
$,4ASMB$,4ASQ1$,4ASQ2$,4ASQ3$,4ASQ4$,4ASQ5$,4ASQ6$,4ASQ7$,4
ASQ8$,4ASQ9$,4ASQ0$,4ASQ10$,4ASQ11$,4ASQ12$,4ASQ13$,4ASQ14$,4
ASQ15$,4ASQ16$,4ASQ17$,4ASQ18$,4ASQ19$,4ASQ20$,4ASQ21$,4ASQ22$,4
ASQ23$,4ASQ24$,4ASQ25$,4ASQ26$,4ASQ27$,4ASQ28$,4ASQ29$,4ASQ30$,4
ASQ31$,4ASQ32$,4ASQ33$,4ASQ34$,4ASQ35$,4ASQ36$,4ASQ37$,4ASQ38$,4
ASQ39$,4ASQ40$,4ASQ41$,4ASQ42$,4ASQ43$,4ASQ44$,4ASQ45$,4ASQ46$,4
ASQ47$,4ASQ48$,4ASQ49$,4ASQ50$,4ASQ51$,4ASQ52$,4ASQ53$,4ASQ54$,4
ASQ55$,4ASQ56$,4ASQ57$,4ASQ58$,4ASQ59$,4ASQ60$,4ASQ61$,4ASQ62$,4
ASQ63$,4ASQ64$,4ASQ65$,4ASQ66$,4ASQ67$,4ASQ68$,4ASQ69$,4ASQ70$,4
ASQ71$,4ASQ72$,4ASQ73$,4ASQ74$,4ASQ75$,4ASQ76$,4ASQ77$,4ASQ78$,4
ASQ79$,4ASQ80$,4ASQ81$,4ASQ82$,4ASQ83$,4ASQ84$,4ASQ85$,4ASQ86$,4
ASQ87$,4ASQ88$,4ASQ89$,4ASQ90$,4ASQ91$,4ASQ92$,4ASQ93$,4ASQ94$,4
ASQ95$,4ASQ96$,4ASQ97$,4ASQ98$,4ASQ99$,4ASQ100$,4ASQ101$,4ASQ102$,4
ASQ103$,4ASQ104$,4ASQ105$,4ASQ106$,4ASQ107$,4ASQ108$,4ASQ109$,4
ASQ110$,4ASQ111$,4ASQ112$,4ASQ113$,4ASQ114$,4ASQ115$,4ASQ116$,4
ASQ117$,4ASQ118$,4ASQ119$,4ASQ120$,4ASQ121$,4ASQ122$,4ASQ123$,4
ASQ124$,4ASQ125$,4ASQ126$,4ASQ127$,4ASQ128$,4ASQ129$,4ASQ130$,4
ASQ131$,4ASQ132$,4ASQ133$,4ASQ134$,4ASQ135$,4ASQ136$,4ASQ137$,4
ASQ138$,4ASQ139$,4ASQ140$,4ASQ141$,4ASQ142$,4ASQ143$,4ASQ144$,4
ASQ145$,4ASQ146$,4ASQ147$,4ASQ148$,4ASQ149$,4ASQ150$,4ASQ151$,4
ASQ152$,4ASQ153$,4ASQ154$,4ASQ155$,4ASQ156$,4ASQ157$,4ASQ158$,4
ASQ159$,4ASQ160$,4ASQ161$,4ASQ162$,4ASQ163$,4ASQ164$,4ASQ165$,4
ASQ166$,4ASQ167$,4ASQ168$,4ASQ169$,4ASQ170$,4ASQ171$,4ASQ172$,4
ASQ173$,4ASQ174$,4ASQ175$,4ASQ176$,4ASQ177$,4ASQ178$,4ASQ179$,4
ASQ180$,4ASQ181$,4ASQ182$,4ASQ183$,4ASQ184$,4ASQ185$,4ASQ186$,4
ASQ187$,4ASQ188$,4ASQ189$,4ASQ190$,4ASQ191$,4ASQ192$,4ASQ193$,4
ASQ194$,4ASQ195$,4ASQ196$,4ASQ197$,4ASQ198$,4ASQ199$,4ASQ200$,4
ASQ201$,4ASQ202$,4ASQ203$,4ASQ204$,4ASQ205$,4ASQ206$,4ASQ207$,4
ASQ208$,4ASQ209$,4ASQ210$,4ASQ211$,4ASQ212$,4ASQ213$,4ASQ214$,4
ASQ215$,4ASQ216$,4ASQ217$,4ASQ218$,4ASQ219$,4ASQ220$,4ASQ221$,4
ASQ222$,4ASQ223$,4ASQ224$,4ASQ225$,4ASQ226$,4ASQ227$,4ASQ228$,4
ASQ229$,4ASQ230$,4ASQ231$,4ASQ232$,4ASQ233$,4ASQ234$,4ASQ235$,4
ASQ236$,4ASQ237$,4ASQ238$,4ASQ239$,4ASQ240$,4ASQ241$,4ASQ242$,4
ASQ243$,4ASQ244$,4ASQ245$,4ASQ246$,4ASQ247$,4ASQ248$,4ASQ249$,4
ASQ250$,4ASQ251$,4ASQ252$,4ASQ253$,4ASQ254$,4ASQ255$,4ASQ256$,4
ASQ257$,4ASQ258$,4ASQ259$,4ASQ260$,4ASQ261$,4ASQ262$,4ASQ263$,4
ASQ264$,4ASQ265$,4ASQ266$,4ASQ267$,4ASQ268$,4ASQ269$,4ASQ270$,4
ASQ271$,4ASQ272$,4ASQ273$,4ASQ274$,4ASQ275$,4ASQ276$,4ASQ277$,4
ASQ278$,4ASQ279$,4ASQ280$,4ASQ281$,4ASQ282$,4ASQ283$,4ASQ284$,4
ASQ285$,4ASQ286$,4ASQ287$,4ASQ288$,4ASQ289$,4ASQ290$,4ASQ291$,4
ASQ292$,4ASQ293$,4ASQ294$,4ASQ295$,4ASQ296$,4ASQ297$,4ASQ298$,4
ASQ299$,4ASQ300$,4ASQ301$,4ASQ302$,4ASQ303$,4ASQ304$,4ASQ305$,4
ASQ306$,4ASQ307$,4ASQ308$,4ASQ309$,4ASQ310$,4ASQ311$,4ASQ312$,4
ASQ313$,4ASQ314$,4ASQ315$,4ASQ316$,4ASQ317$,4ASQ318$,4ASQ319$,4
ASQ320$,4ASQ321$,4ASQ322$,4ASQ323$,4ASQ324$,4ASQ325$,4ASQ326$,4
ASQ327$,4ASQ328$,4ASQ329$,4ASQ330$,4ASQ331$,4ASQ332$,4ASQ333$,4
ASQ334$,4ASQ335$,4ASQ336$,4ASQ337$,4ASQ338$,4ASQ339$,4ASQ340$,4
ASQ341$,4ASQ342$,4ASQ343$,4ASQ344$,4ASQ345$,4ASQ346$,4ASQ347$,4
ASQ348$,4ASQ349$,4ASQ350$,4ASQ351$,4ASQ352$,4ASQ353$,4ASQ354$,4
ASQ355$,4ASQ356$,4ASQ357$,4ASQ358$,4ASQ359$,4ASQ360$,4ASQ361$,4
ASQ362$,4ASQ363$,4ASQ364$,4ASQ365$,4ASQ366$,4ASQ367$,4ASQ368$,4
ASQ369$,4ASQ370$,4ASQ371$,4ASQ372$,4ASQ373$,4ASQ374$,4ASQ375$,4
ASQ376$,4ASQ377$,4ASQ378$,4ASQ379$,4ASQ380$,4ASQ381$,4ASQ382$,4
ASQ383$,4ASQ384$,4ASQ385$,4ASQ386$,4ASQ387$,4ASQ388$,4ASQ389$,4
ASQ390$,4ASQ391$,4ASQ392$,4ASQ393$,4ASQ394$,4ASQ395$,4ASQ396$,4
ASQ397$,4ASQ398$,4ASQ399$,4ASQ400$,4ASQ401$,4ASQ402$,4ASQ403$,4
ASQ404$,4ASQ405$,4ASQ406$,4ASQ407$,4ASQ408$,4ASQ409$,4ASQ410$,4
ASQ411$,4ASQ412$,4ASQ413$,4ASQ414$,4ASQ415$,4ASQ416$,4ASQ417$,4
ASQ418$,4ASQ419$,4ASQ420$,4ASQ421$,4ASQ422$,4ASQ423$,4ASQ424$,4
ASQ425$,4ASQ426$,4ASQ427$,4ASQ428$,4ASQ429$,4ASQ430$,4ASQ431$,4
ASQ432$,4ASQ433$,4ASQ434$,4ASQ435$,4ASQ436$,4ASQ437$,4ASQ438$,4
ASQ439$,4ASQ440$,4ASQ441$,4ASQ442$,4ASQ443$,4ASQ444$,4ASQ445$,4
ASQ446$,4ASQ447$,4ASQ448$,4ASQ449$,4ASQ450$,4ASQ451$,4ASQ452$,4
ASQ453$,4ASQ454$,4ASQ455$,4ASQ456$,4ASQ457$,4ASQ458$,4ASQ459$,4
ASQ460$,4ASQ461$,4ASQ462$,4ASQ463$,4ASQ464$,4ASQ465$,4ASQ466$,4
ASQ467$,4ASQ468$,4ASQ469$,4ASQ470$,4ASQ471$,4ASQ472$,4ASQ473$,4
ASQ474$,4ASQ475$,4ASQ476$,4ASQ477$,4ASQ478$,4ASQ479$,4ASQ480$,4
ASQ481$,4ASQ482$,4ASQ483$,4ASQ484$,4ASQ485$,4ASQ486$,4ASQ487$,4
ASQ488$,4ASQ489$,4ASQ490$,4ASQ491$,4ASQ492$,4ASQ493$,4ASQ494$,4
ASQ495$,4ASQ496$,4ASQ497$,4ASQ498$,4ASQ499$,4ASQ500$,4ASQ501$,4
ASQ502$,4ASQ503$,4ASQ504$,4ASQ505$,4ASQ506$,4ASQ507$,4ASQ508$,4
ASQ509$,4ASQ510$,4ASQ511$,4ASQ512$,4ASQ513$,4ASQ514$,4ASQ515$,4
ASQ516$,4ASQ517$,4ASQ518$,4ASQ519$,4ASQ520$,4ASQ521$,4ASQ522$,4
ASQ523$,4ASQ524$,4ASQ525$,4ASQ526$,4ASQ527$,4ASQ528$,4ASQ529$,4
ASQ530$,4ASQ531$,4ASQ532$,4ASQ533$,4ASQ534$,4ASQ535$,4ASQ536$,4
ASQ537$,4ASQ538$,4ASQ539$,4ASQ540$,4ASQ541$,4ASQ542$,4ASQ543$,4
ASQ544$,4ASQ545$,4ASQ546$,4ASQ547$,4ASQ548$,4ASQ549$,4ASQ550$,4
ASQ551$,4ASQ552$,4ASQ553$,4ASQ554$,4ASQ555$,4ASQ556$,4ASQ557$,4
ASQ558$,4ASQ559$,4ASQ560$,4ASQ561$,4ASQ562$,4ASQ563$,4ASQ564$,4
ASQ565$,4ASQ566$,4ASQ567$,4ASQ568$,4ASQ569$,4ASQ570$,4ASQ571$,4
ASQ572$,4ASQ573$,4ASQ574$,4ASQ575$,4ASQ576$,4ASQ577$,4ASQ578$,4
ASQ579$,4ASQ580$,4ASQ581$,4ASQ582$,4ASQ583$,4ASQ584$,4ASQ585$,4
ASQ586$,4ASQ587$,4ASQ588$,4ASQ589$,4ASQ590$,4ASQ591$,4ASQ592$,4
ASQ593$,4ASQ594$,4ASQ595$,4ASQ596$,4ASQ597$,4ASQ598$,4ASQ599$,4
ASQ600$,4ASQ601$,4ASQ602$,4ASQ603$,4ASQ604$,4ASQ605$,4ASQ606$,4
ASQ607$,4ASQ608$,4ASQ609$,4ASQ610$,4ASQ611$,4ASQ612$,4ASQ613$,4
ASQ614$,4ASQ615$,4ASQ616$,4ASQ617$,4ASQ618$,4ASQ619$,4ASQ620$,4
ASQ621$,4ASQ622$,4ASQ623$,4ASQ624$,4ASQ625$,4ASQ626$,4ASQ627$,4
ASQ628$,4ASQ629$,4ASQ630$,4ASQ631$,4ASQ632$,4ASQ633$,4ASQ634$,4
ASQ635$,4ASQ636$,4ASQ637$,4ASQ638$,4ASQ639$,4ASQ640$,4ASQ641$,4
ASQ642$,4ASQ643$,4ASQ644$,4ASQ645$,4ASQ646$,4ASQ647$,4ASQ648$,4
ASQ649$,4ASQ650$,4ASQ651$,4ASQ652$,4ASQ653$,4ASQ654$,4ASQ655$,4
ASQ656$,4ASQ657$,4ASQ658$,4ASQ659$,4ASQ660$,4ASQ661$,4ASQ662$,4
ASQ663$,4ASQ664$,4ASQ665$,4ASQ666$,4ASQ667$,4ASQ668$,4ASQ669$,4
ASQ670$,4ASQ671$,4ASQ672$,4ASQ673$,4ASQ674$,4ASQ675$,4ASQ676$,4
ASQ677$,4ASQ678$,4ASQ679$,4ASQ680$,4ASQ681$,4ASQ682$,4ASQ683$,4
ASQ684$,4ASQ685$,4ASQ686$,4ASQ687$,4ASQ688$,4ASQ689$,4ASQ690$,4
ASQ691$,4ASQ692$,4ASQ693$,4ASQ694$,4ASQ695$,4ASQ696$,4ASQ697$,4
ASQ698$,4ASQ699$,4ASQ700$,4ASQ701$,4ASQ702$,4ASQ703$,4ASQ704$,4
ASQ705$,4ASQ706$,4ASQ707$,4ASQ708$,4ASQ709$,4ASQ710$,4ASQ711$,4
ASQ712$,4ASQ713$,4ASQ714$,4ASQ715$,4ASQ716$,4ASQ717$,4ASQ718$,4
ASQ719$,4ASQ720$,4ASQ721$,4ASQ722$,4ASQ723$,4ASQ724$,4ASQ725$,4
ASQ726$,4ASQ727$,4ASQ728$,4ASQ729$,4ASQ730$,4ASQ731$,4ASQ732$,4
ASQ733$,4ASQ734$,4ASQ735$,4ASQ736$,4ASQ737$,4ASQ738$,4ASQ739$,4
ASQ740$,4ASQ741$,4ASQ742$,4ASQ743$,4ASQ744$,4ASQ745$,4ASQ746$,4
ASQ747$,4ASQ748$,4ASQ749$,4ASQ750$,4ASQ751$,4ASQ752$,4ASQ753$,4
ASQ754$,4ASQ755$,4ASQ756$,4ASQ757$,4ASQ758$,4ASQ759$,4ASQ760$,4
ASQ761$,4ASQ762$,4ASQ763$,4ASQ764$,4ASQ765$,4ASQ766$,4ASQ767$,4
ASQ768$,4ASQ769$,4ASQ770$,4ASQ771$,4ASQ772$,4ASQ773$,4ASQ774$,4
ASQ775$,4ASQ776$,4ASQ777$,4ASQ778$,4ASQ779$,4ASQ780$,4ASQ781$,4
ASQ782$,4ASQ783$,4ASQ784$,4ASQ785$,4ASQ786$,4ASQ787$,4ASQ788$,4
ASQ789$,4ASQ790$,4ASQ791$,4ASQ792$,4ASQ793$,4ASQ794$,4ASQ795$,4
ASQ796$,4ASQ797$,4ASQ798$,4ASQ799$,4ASQ800$,4ASQ801$,4ASQ802$,4
ASQ803$,4ASQ804$,4ASQ805$,4ASQ806$,4ASQ807$,4ASQ808$,4ASQ809$,4
ASQ810$,4ASQ811$,4ASQ812$,4ASQ813$,4ASQ814$,4ASQ815$,4ASQ816$,4
ASQ817$,4ASQ818$,4ASQ819$,4ASQ820$,4ASQ821$,4ASQ822$,4ASQ823$,4
ASQ824$,4ASQ825$,4ASQ826$,4ASQ827$,4ASQ828$,4ASQ829$,4ASQ830$,4
ASQ831$,4ASQ832$,4ASQ833$,4ASQ834$,4ASQ835$,4ASQ836$,4ASQ837$,4
ASQ838$,4ASQ839$,4ASQ840$,4ASQ841$,4ASQ842$,4ASQ843$,4ASQ844$,4
ASQ845$,4ASQ846$,4ASQ847$,4ASQ848$,4ASQ849$,4ASQ850$,4ASQ851$,4
ASQ852$,4ASQ853$,4ASQ854$,4ASQ855$,4ASQ856$,4ASQ857$,4ASQ858$,4
ASQ859$,4ASQ860$,4ASQ861$,4ASQ862$,4ASQ863$,4ASQ864$,4ASQ865$,4
ASQ866$,4ASQ867$,4ASQ868$,4ASQ869$,4ASQ870$,4ASQ871$,4ASQ872$,4
ASQ873$,4ASQ874$,4ASQ875$,4ASQ876$,4ASQ877$,4ASQ878$,4ASQ879$,4
ASQ880$,4ASQ881$,4ASQ882$,4ASQ883$,4ASQ884$,4ASQ885$,4ASQ886$,4
ASQ887$,4ASQ888$,4ASQ889$,4ASQ890$,4ASQ891$,4ASQ892$,4ASQ893$,4
ASQ894$,4ASQ895$,4ASQ896$,4ASQ897$,4ASQ898$,4ASQ899$,4ASQ900$,4
ASQ901$,4ASQ902$,4ASQ903$,4ASQ904$,4ASQ905$,4ASQ906$,4ASQ907$,4
ASQ908$,4ASQ909$,4ASQ910$,4ASQ911$,4ASQ912$,4ASQ913$,4ASQ914$,4
ASQ915$,4ASQ916$,4ASQ917$,4ASQ918$,4ASQ919$,4ASQ920$,4ASQ921$,4
ASQ922$,4ASQ923$,4ASQ924$,4ASQ925$,4ASQ926$,4ASQ927$,4ASQ928$,4
ASQ929$,4ASQ930$,4ASQ931$,4ASQ932$,4ASQ933$,4ASQ934$,4ASQ935$,4
ASQ936$,4ASQ937$,4ASQ938$,4ASQ939$,4ASQ940$,4ASQ941$,4ASQ942$,4
ASQ943$,4ASQ944$,4ASQ945$,4ASQ946$,4ASQ947$,4ASQ948$,4ASQ949$,4
ASQ950$,4ASQ951$,4ASQ952$,4ASQ953$,4ASQ954$,4ASQ955$,4ASQ956$,4
ASQ957$,4ASQ958$,4ASQ959$,4ASQ960$,4ASQ961$,4ASQ962$,4ASQ963$,4
ASQ964$,4ASQ965$,4ASQ966$,4ASQ967$,4ASQ968$,4ASQ969$,4ASQ970$,4
ASQ971$,4ASQ972$,4ASQ973$,4ASQ974$,4ASQ975$,4ASQ976$,4ASQ977$,4
ASQ978$,4ASQ979$,4ASQ980$,4ASQ981$,4ASQ982$,4ASQ983$,4ASQ984$,4
ASQ985$,4ASQ986$,4ASQ987$,4ASQ988$,4ASQ989$,4ASQ990$,4ASQ991$,4
ASQ992$,4ASQ993$,4ASQ994$,4ASQ995$,4ASQ996$,4ASQ997$,4ASQ998$,4
ASQ999$,4ASQ1000$,4ASQ1001$,4ASQ1002$,4ASQ1003$,4ASQ1004$,4ASQ1005$,4
ASQ1006$,4ASQ1007$,4ASQ1008$,4ASQ1009$,4ASQ1010$,4ASQ1011$,4ASQ1012$,4
ASQ1013$,4ASQ1014$,4ASQ1015$,4ASQ1016$,4ASQ1017$,4ASQ1018$,4ASQ1019$,4
ASQ1020$,4ASQ1021$,4ASQ1022$,4ASQ1023$,4ASQ1024$,4ASQ1025$,4ASQ1026$,4
ASQ1027$,4ASQ1028$,4ASQ1029$,4ASQ1030$,4ASQ1031$,4ASQ1032$,4ASQ1033$,4
ASQ1034$,4ASQ1035$,4ASQ1036$,4ASQ1037$,4ASQ1038$,4ASQ1039$,4ASQ1040$,4
ASQ1041$,4ASQ1042$,4ASQ1043$,4ASQ1044$,4ASQ1045$,4ASQ1046$,4ASQ1047$,4
ASQ1048$,4ASQ1049$,4ASQ1050$,4ASQ1051$,4ASQ1052$,4ASQ1053$,4ASQ1054$,4
ASQ1055$,4ASQ1056$,4ASQ1057$,4ASQ1058$,4ASQ1059$,4ASQ1060$,4ASQ1061$,4
ASQ1062$,4ASQ1063$,4ASQ1064$,4ASQ1065$,4ASQ1066$,4ASQ1067$,4ASQ1068$,4
ASQ1069$,4ASQ1070$,4ASQ1071$,4ASQ1072$,4ASQ1073$,4ASQ1074$,4ASQ1075$,4
ASQ1076$,4ASQ1077$,4ASQ1078$,4ASQ1079$,4ASQ1080$,4ASQ1081$,4ASQ1082$,4
ASQ1083$,4ASQ1084$,4ASQ1085$,4ASQ1086$,4ASQ1087$,4ASQ1088$,4ASQ1089$,4
ASQ1090$,4ASQ1091$,4ASQ1092$,4ASQ1093$,4ASQ1094$,4ASQ1095$,4ASQ1096$,4
ASQ1097$,4ASQ1098$,4ASQ1099$,4ASQ1100$,4ASQ1101$,4ASQ1102$,4ASQ1103$,4
ASQ1104$,4ASQ1105$,4ASQ1106$,4ASQ1107$,4ASQ1108$,4ASQ1109$,4ASQ1110$,4
ASQ1111$,4ASQ1112$,4ASQ1113$,4ASQ1114$,4ASQ1115$,4ASQ1116$,4ASQ1117$,4
ASQ1118$,4ASQ1119$,4ASQ1120$,4ASQ1121$,4ASQ1122$,4ASQ1123$,4ASQ1124$,4
ASQ1125$,4ASQ1126$,4ASQ1127$,4ASQ1128$,4ASQ1129$,4ASQ1130$,4ASQ1131$,4
ASQ1132$,4ASQ1133$,4ASQ1134$,4ASQ1135$,4ASQ1136$,4ASQ1137$,4ASQ1138$,4
ASQ1139$,4ASQ1140$,4ASQ1141$,4ASQ1142$,4ASQ1143$,4ASQ1144$,4ASQ1145$,4
ASQ1146$,4ASQ1147$,4ASQ1148$,4ASQ1149$,4ASQ1150$,4ASQ1151$,4ASQ1152$,4
ASQ1153$,4ASQ1154$,4ASQ1155$,4ASQ1156$,4ASQ1157$,4ASQ1158$,4ASQ1159$,4
ASQ1160$,4ASQ1161$,4ASQ1162$,4ASQ1163$,4ASQ1164$,4ASQ1165$,4ASQ1166$,4
ASQ1167$,4ASQ1168$,4ASQ1169$,4ASQ1170$,4ASQ1171$,4ASQ1172$,4ASQ1173$,4
ASQ1174$,4ASQ1175$,4ASQ1176$,4ASQ1177$,4ASQ1178$,4ASQ1179$,4ASQ1180$,4
ASQ1181$,4ASQ1182$,4ASQ1183$,4ASQ1184$,4ASQ1185$,4ASQ1186$,4ASQ1187$,4
ASQ1188$,4ASQ1189$,4ASQ1190$,4ASQ1191$,4ASQ1192$,4ASQ1193$,4ASQ1194$,4
ASQ1195$,4ASQ1196$,4ASQ1197$,4ASQ1198$,4ASQ1199$,4ASQ1200$,4ASQ1201$,4
ASQ1202$,4ASQ1203$,4ASQ1204$,4ASQ1205$,4ASQ1206$,4ASQ1207$,4ASQ1208$,4
ASQ1209$,4ASQ1210$,4ASQ1211$,4ASQ1212$,4ASQ1213$,4ASQ1214$,4ASQ1215$,4
ASQ1216$,4ASQ1217$,4ASQ1218$,4ASQ1219$,4ASQ1220$,4ASQ1221$,4ASQ1222$,4
ASQ1223$,4ASQ1224$,4ASQ1225$,4ASQ1226$,4ASQ1227$,4ASQ1228$,4ASQ1229$,4
ASQ1230$,4ASQ1231$,4ASQ1232$,4ASQ1233$,4ASQ1234$,4ASQ1235$,4ASQ1236$,4
ASQ1237$,4ASQ1238$,4ASQ1239$,4ASQ1240$,4ASQ1241$,4ASQ1242$,4ASQ1243$,4
ASQ1244$,4ASQ1245$,4ASQ1246$,4ASQ1247$,4ASQ1248$,4ASQ1249$,4ASQ1250$,4
ASQ1251$,4ASQ1252$,4ASQ1253$,4ASQ1254$,4ASQ1255$,4ASQ1256$,4ASQ1257$,4
ASQ1258$,4ASQ1259$,4ASQ1260$,4ASQ1261$,4ASQ1262$,4ASQ1263$,4ASQ1264$,4
ASQ1265$,4ASQ1266$,4ASQ1267$,4ASQ1268$,4ASQ1269$,4ASQ1270$,4ASQ1271$,4
ASQ1272$,4ASQ1273$,4ASQ1274$,4ASQ1275$,4ASQ1276$,4ASQ1277$,4ASQ1278$,4
ASQ1279$,4ASQ1280$,4ASQ1281$,4ASQ1282$,4ASQ1283$,4ASQ1284$,4ASQ1285$,4
ASQ1286$,4ASQ1287$,4ASQ1288$,4ASQ1289$,4ASQ1290$,4ASQ1291$,4ASQ1292$,4
ASQ1293$,4ASQ1294$,4ASQ1295$,4ASQ1296$,4ASQ1297$,4ASQ1298$,4ASQ1299$,4
ASQ1300$,4ASQ1301$,4ASQ1302$,4ASQ1303$,4ASQ1304$,4ASQ1305$,4ASQ1306$,4
ASQ1307$,4ASQ1308$,4ASQ1309$,4ASQ1310$,4ASQ1311$,4ASQ1312$,4ASQ1313$,4
ASQ1314$,4ASQ1315$,4ASQ1316$,4ASQ1317$,4ASQ1318$,4ASQ1319$,4ASQ1320$,4
ASQ1321$,4ASQ1322$,4ASQ1323$,4ASQ1324$,4ASQ1325$,4ASQ1326$,4ASQ1327$,4
ASQ1328$,4ASQ1329$,4ASQ1330$,4ASQ1331$,4ASQ1332$,4ASQ1333$,4ASQ1334$,4
ASQ1335$,4ASQ1336$,4ASQ1337$,4ASQ1338$,4ASQ1339$,4ASQ1340$,4ASQ1341$,4
ASQ1342$,4ASQ1343$,4ASQ1344$,4ASQ1345$,4ASQ1346$,4ASQ1347$,4ASQ1348$,4
ASQ1349$,4ASQ1350$,4ASQ1351$,4ASQ1352$,4ASQ1353$,4ASQ1354$,4ASQ1355$,4
ASQ1356$,4ASQ1357$,4ASQ1358$,4ASQ1359$,4ASQ1360$,4ASQ1361$,4ASQ1362$,4
ASQ1363$,4ASQ1364$,4ASQ1365$,4ASQ1366$,4ASQ1367$,4ASQ1368$,4ASQ1369$,4
ASQ1370$,4ASQ1371$,4ASQ1372$,4ASQ1373$,4ASQ1374$,4ASQ1375$,4ASQ1376$,4
ASQ1377$,4ASQ1378$,4ASQ1379$,4ASQ1380$,4ASQ1381$,4ASQ1382$,4ASQ1383$,4
ASQ1384$,4ASQ1385$,4ASQ1386$,4ASQ1387$,4ASQ1388$,4ASQ1389$,4ASQ1390$,4
ASQ1391$,4ASQ1392$,4ASQ1393$,4ASQ1394$,4ASQ1395$,4ASQ1396$,4ASQ1397$,4
ASQ1398$,4ASQ1399$,4ASQ1400$,4ASQ1401$,4ASQ1402$,4ASQ1403$,4ASQ1404$,4
ASQ1405$,4ASQ1406$,4ASQ1407$,4ASQ1408$,4ASQ1409$,4ASQ1410$,4ASQ1411$,4
ASQ1412$,4ASQ1413$,4ASQ1414$,4ASQ1415$,4ASQ1416$,4ASQ1417$,4ASQ1418$,4
ASQ1419$,4ASQ1420$,4ASQ1421$,4ASQ1422$,4ASQ1423$,4ASQ1424$,4ASQ1425$,4
ASQ1426$,4ASQ1427$,4ASQ1428$,4ASQ1429$,
```

```

1  '***** REVIEW OF TRANSACTION FILES *****
2
3  'PROGRAMMER: DR. ANTONIO M. LOPEZ, JR.
4  'PROGRAM- ID -- REVIEW -- LAST MODIFIED ==> MAY 22, 1979
5  CLS: CLEAR 1000: PRINT "THIS PROGRAM ALLOWS YOU TO REVIEW THE
6  TRANSACTION FILE FOR A PARTICULAR MONTH"
7
8  DEFINIT A,I: INPUT "ENTER 3 CHARACTER MONTH CODE"; MS
9  OPEN "R",1,MS: AL=LOF(1)
10 INPUT "DO YOU WISH TO HAVE A PRINTED COPY OF THE TRANSACTIONS"; QS
11 IF QS="NO" THEN GOTO 210
12 IF QS<>"YES" THEN PRINT "PLEASE ANSWER WITH A YES OR NO": GOTO 40
13
14 CLS: PRINT "***** LISTING TRANSACTION FILE *****"
15 PRINT: PRINT "TURN ON LINE PRINTER -- CHECK PAPER"
16 FOR I=1 TO 5000: NEXT I
17 LPRINT TAB(30) "TRANSACTION FILE -- "; MS: LPRINT "
18 LPRINT "ACCOUNT#"; TAB(15) "DESCRIPTION"; TAB(45) "DATE"; TAB(5
19 5) "CHK/REC#"; " AMOUNT"
20
21 LPRINT " ": LPRINT " "
22 FOR AR=1 TO AL
23 GET 1,AR
24 FOR AA=1 TO T06
25 GOSUB 400
26 IF CVI(ACS)=-1 THEN GOTO 200
27 LPRINT TAB(3) CVI(ACS); TAB(10) DSS; TAB(44)
28 CVI(DTS); TAB(57) CVI(RCS); " "
29 CVS(AT$)
30
31 NEXT AA
32 NEXT AR
33 CLS: PRINT "END OF PROGRAM: REVIEW": CLOSE: END
34 FOR AR=1 TO AL: CLS: PRINT TAB(20) "TRANSACTION FILE "; MS: PRI
35 NT
36
37 PRINT "ACCOUNT#"; TAB(10) "DESCRIPTION"; TAB(33) "DATE"; TAB(40)
38 "CHK/RES#"; TAB(50) "AMOUNT"
39
40 GET 9,AR
41 FOR AA=1 TO T06
42 GOSUB 400
43 IF CVI(ACS)=-1 THEN GOTO 315
44 PRINT TAB(1) CVI(ACS); TAB(10) DSS
45 PRINT TAB(31) CVI(DTS); TAB(41) CVI(RCS);
46 PRINT TAB(50) CVS(AT$)
47
48 NEXT AA
49 INPUT "HIT <ENTER> TO CONTINUE"; QS
50
51 NEXT AR
52 GOTO 200
53
54 FIELD 1, ((AA-1)*40) AS STARTHER$, 2AS ACS$, 30ASDSS$, 2ASDTS$, 2
55 ASRS$, 4ASAT$: RETURN

```

Program Listing 10.

Adventure
International

Proudly Announces
GALACTIC EMPIRE

Beyond all Star Trek programs! This real time simulation pits you and your puny fleet against an entire galaxy. Traveling at sublight speeds, assisted by your executive officers you must carve out a Galactic Empire. As system after system is conquered you'll add to your growing fleet, but be careful to plan far enough in advance or ships and supplies may not reach you in time and populations may revolt! You'll have 1000 years to accomplish your mission, but be warned, few mortals are able to outlive a millennium!

Available now for \$14.95 from the company that brought you Adventures. Write for free flyer or ask for it at your local computer dealer.

Adventure International ✓97

Box 3435

Longwood, FL 32750

Visa/MC orders, call (305) 862-6917

Program Listing 9.

*Turn your display inside out,
and let your eyes benefit from the results.*

Reverse Video

Dennis Kitz
Roxbury, VT 05669

If it's so easy, why didn't it come with the TRS-80? A good question, indeed. Let's just say that the 80 monitor is—uh—a bit weak in some respects. But take heart (and a soldering iron), the time is at hand to read black letters on a white background.

By now, all of you've read Faster! Faster! the high speed modification which appeared in the February issue of 80 Microcomputing. The principle is much the same, and the entire port wiring is identical—in fact, that is the wiring which will be used for reverse video (and is used in the lowercase modifica-

tion I have installed on my machine). So here are the details.

Integrated Circuits

Get these integrated circuits: a 74LS368 and a 74LS74; plus a 74LS02 if you haven't done the high-speed mod. Get some wire wrap or other thin wire, a 1.5K resistor and gather up your soldering skills. Open up the TRS-80 and locate the following ICs: Z22, Z26, Z27, Z30, Z52, Z53, Z54, Z59.

If you've installed my high-speed modification, skip the next three paragraphs.

Prepare the 74LS02 by bending all the leads except 7 and 14 so that they are parallel with the body of the integrated circuit.

Find Z53. Seat the 74LS02 directly atop Z53, with the notch facing in the same direction, and solder pins 7 and 14 of the top IC to pins 7 and 14 of the one below. These are the power and ground pins of the 74LS02, which we will call "ZGATE".

Find Z52. Run a wire from pin 6 of Z52 to pins 2 and 3 of ZGATE and solder. Now locate Z54. Run and solder a wire from pin 8 of this IC to pin 11 of ZGATE. Next run a short wire between pins 1 and 12 of ZGATE. The previous three steps decode eight address lines into FE hex (254 decimal), which is the output port used for all my modifications.

Now it is necessary to connect the output signal into place. Locate Z22; pin 3 has the OUT signal. Run a wire from this pin to pin 5 of ZGATE. Now solder together pin 8, 9 and 13 of ZGATE. Finally run a short wire between pin 6 and pin 10 of ZGATE. The remaining pin (pin 4) contains a fully decoded output signal that goes high whenever the instruction "OUT 254..." is executed.

Hi high-speeders. Welcome back to the text. We're out of spare flip-flops on the CPU board itself, so we have to supply one, the 74LS74. Located Z26. Prepare the 74LS74 by bending all leads except 7 and 14 so that they are parallel to the body of the IC. Now seat the 74LS74 upon Z26, and solder down pins 7 and 14. Again, these are the power pins; now we will

call this piggybacked IC "ZFLIP".

Run a wire from pin 4 of ZGATE to pin 11 of ZFLIP. Find Z59, which has convenient data lines. Run a wire from pin 5 (Data line 1) of Z59 to pin 12 of ZFLIP. Now run short wires connecting pins 10, 13 and 14 of ZFLIP. These steps get the OUT 254 signal to ZFLIP, get data to it and enable it, respectively. The instruction "OUT 254,2" will flip it; "OUT 254,0" will flop it. Now we have to give the flips and flops some work to do.

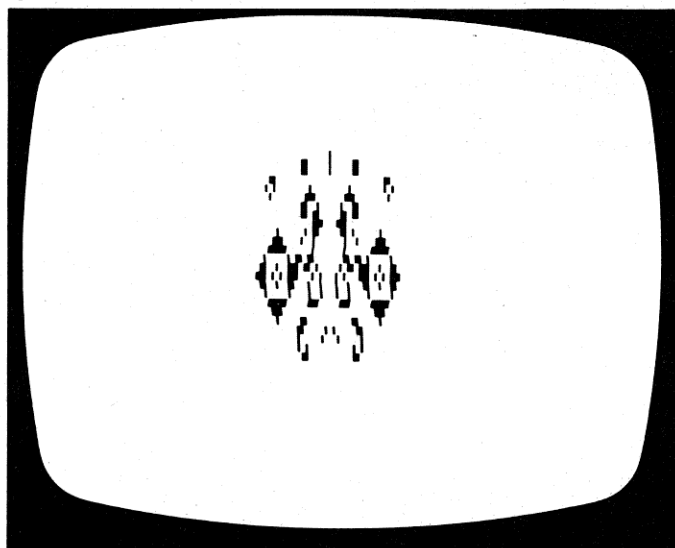
Pick up the 74LS368. Again, bend the leads parallel to the body, except pins 8 and 16, the power pins. Seat this IC atop Z27, and solder down pins 8 and 16. Now that this has power, we will call it ZCOLOR.

Reverse Video

To get reverse video, the principle is simple: merely reverse the times the video beam is on (producing white dots) or off (producing black "undots"). We will make it produce black dots for letters and white "undots" for the background.

Locate Z30 and Z52. Find pin 1 of Z30, which is connected via a circuit board trace on the underside of the board to pins 6 and 7 of Z52. Cut the trace near Z30. The computer's video information signal comes out of pin 1 of Z30. It is now free.

Run a wire between this pin (pin 1 of Z30) and pins 2 and 14 of ZCOLOR. ZCOLOR is an inverting buffer, which is ideal... if



Example of reverse video from the upcoming *Game of Life* article by Dennis Kitz.

**NEW
VERSATILITY
For Your TRS-80**

**FROM THE ORIGINATOR
OF THE TRS-80 PROJECT**



HEADQUARTERS FOR PASCAL And Other High Level Languages

PASCAL COMPILER

Pascal/MT™ is designed to run under CP/M. It provides an efficient development cycle plus efficiently executing object programs using a highly structured language so fewer programming errors are made. Pascal/MT has extensions to standard Pascal.

Features:

- *Compiler executes only in 32K.
- *Direct I/O manipulation.
- *Logical Functions allow bit manipulation.
- *Assembly languages interface.
- *Object programs execute ten times faster than P-code system.
- *Includes real time symbolic debugger.
- *Accurate 16 digit BCD business arithmetic.

Package Includes System Diskette and Instruction Book (Requires CP/M)

price..... **\$250⁰⁰**

Same package (TRS-DOS version) price..... **\$300⁰⁰**

Same package (S-100 CPM version with 8" diskette) price..... **\$100⁰⁰**

HIGHLY RECOMMENDED PASCAL MANUALS

"Pascal Users Manual and Report"
Price, Manual Only..... **\$9⁹⁵**

UCSD Reference Manual
Price, Manual Only..... **\$25⁰⁰**

"Problem Solving Using Pascal," the beginner's book for UCSD Pascal
Price, Manual Only..... **\$14⁹⁵**

"Programming in Pascal"
Price, Manual Only..... **\$14⁹⁵**

"Pascal Primer"
Price, Manual Only..... **\$17⁹⁵**

TEXTWRITER II

Exclusively from FMG

A text formatting program that prints files created by an editing program. Contracts, personalized form letters and other documents can be printed from a stored library of standard paragraphs.

Price..... **\$75⁰⁰**
Price (Manual only)..... **\$25⁰⁰**

TEXTWRITER III

All features of Textwriter II plus ability to computer create Indexes and Table of Contents.

Price..... **\$125⁰⁰**

CP/M® OPERATING SYSTEM

New 1.5 Version

Includes RS-232 and I/O Byte implementation, Editor, Assembler, Debugger and Utilities for 8080 and Z80 Systems.

Package Includes:

- *CP/M System Diskette 5 1/4"
 - *CP/M Features and facilities Manual
 - *CP/M Editor's Manual
 - *CP/M Assembler Manual
 - *CP/M Debugger Manual
 - *CP/M Interface Guide
- PRICE..... **\$150⁰⁰** (Requires 16K and one drive min.)

Price, set of 5 (Manuals only)..... **\$25⁰⁰**

Update for 1.4 version owners, new disc supplied..... **\$20⁰⁰**

FORTRAN

Comparable to compilers on large main frames and minicomputers. All of ANSI standard FORTRAN X 3.9-1966 is included except COMPLEX data type. Therefore, users may take advantage of the many applications programs already written in FORTRAN.

Features:

- *FORTRAN Compiler
- *Macro Assembler (280)
- *Linker
- *Library
- *Lib Manager (Not in TRS-DOS version)

FORTRAN, TRS-CP/M version price... **\$200⁰⁰**

FORTRAN, TRS-DOS version price... **\$150⁰⁰**

Price for each (Manual only)..... **\$25⁰⁰**

TRS-80 COMMUNICATOR

New RS232 Communication Program that allows your TRS-80 to transmit or receive programs and data files. Also makes the TRS-80 into a remote terminal. Requires Radio Shack RS232.

TRS-CP/M version..... **\$25⁰⁰**

TRS-DOS version..... **\$35⁰⁰**

Call or write for complete information



(817) 294-2510

P.O. Box 16363(80) • Fort Worth, Texas 76133

High Level Languages for the TRS-80

BASIC • FORTRAN • COBOL • PASCAL



CP/M is a registered trademark of Digital Research Corp. • TRS-80 is a registered trademark of Radio Shack.



TRS-COBOL-80

FMG's Microsoft COBOL brings the world's most widely used computer programming language to the TRS-80 user. FMG COBOL-80 is comparable to COBOL systems found on minicomputers and large mainframes. Consequently, it greatly enhances the usefulness of microcomputers because it gives users access to the incredibly large numbers of programs already written in COBOL. Because COBOL-80 is a standard, COBOL programs written on other computers may be run easily on the TRS-80.

FMG TRS-COBOL-80 is based on the 1974 ANSI standard. It combines all Level 1 features and the most useful Level 2 options for the "Nucleus" and for sequential Relative and Indexing file handling facilities.

The FMG TRS-COBOL-80 system includes a compiler for translating source code into relocatable object code (which, incidentally, is compatible with the object code of our FORTRAN-80 compiler and MACRO-80 assembler), and a routine system for running the program by interpreting the object code at execution time. It also includes screen handling capabilities for easy use of interaction.

Requires 48K, CP/M and 2 Mini Disk Drives.

Price..... **\$750⁰⁰**

UCSD PASCAL

The powerful, general purpose language system, originally developed for large, complex system, is now available from FMG for your TRS-80. This new FMG/UCSD Pascal System greatly increases the value and capability of the TRS-80.

Package Includes:

- *Operating System
- *Screen Editor
- *280 Macro Assembler
- *Library
- *Pascal Compiler
- *Utilities and System Reference Book

Price..... **\$150⁰⁰** (Requires 48K, 2 drive System)

available without Macro Assembler, Linker and Library (not for compiling programs) price..... **\$100⁰⁰**

For recommended Pascal manuals, refer to "PASCAL COMPILER" listing.

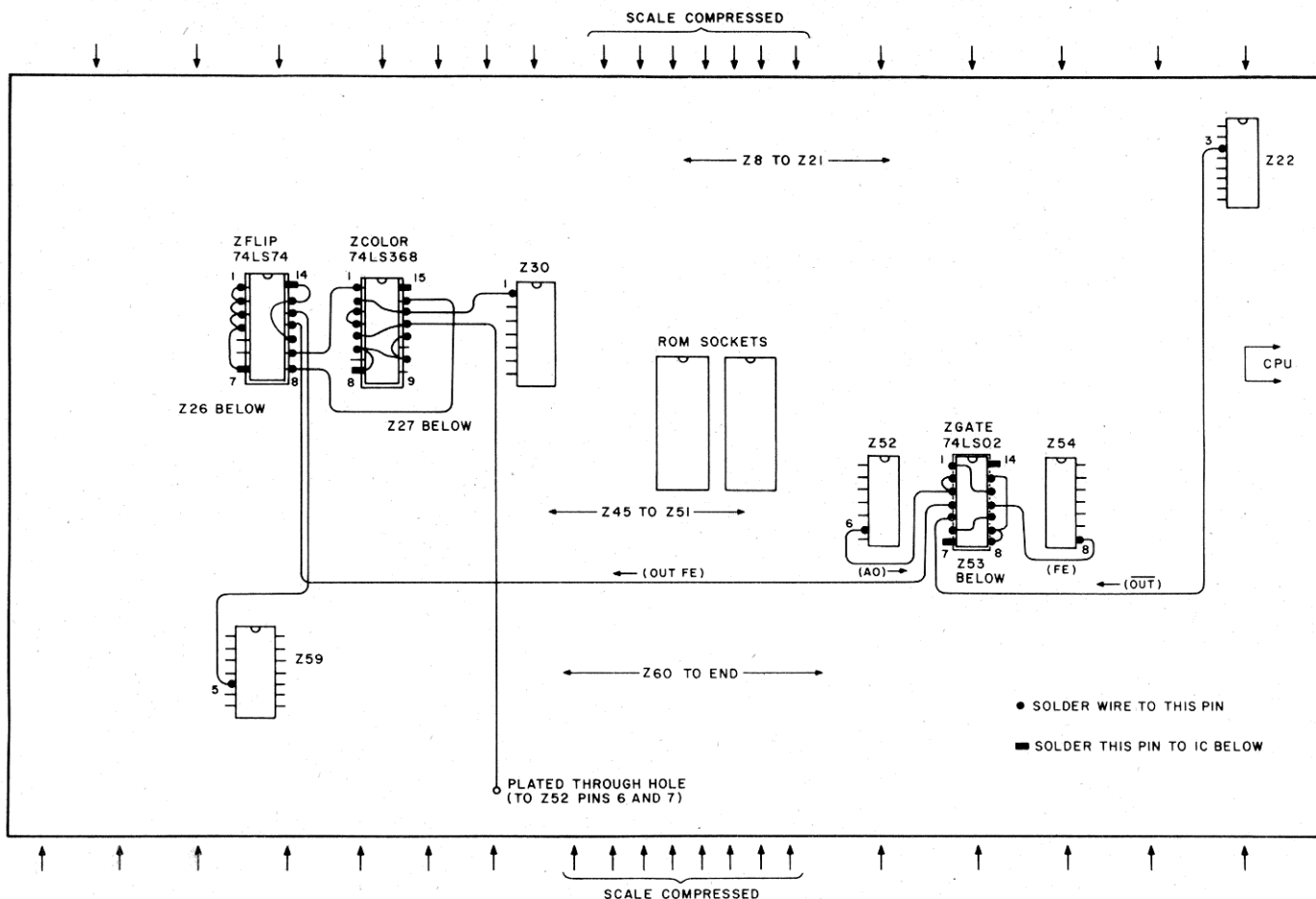


Fig. 2 Parts Layout

we invert the signal once—pres-to!—reverse video. Two inversions return it to the original condition, normal video. Now connect pins 3 and 4 of ZCOLOR together. This performs the two inversions. Pin 5 is the normal video output and pin 13 is now the reverse video output. Connect pins 5 and 13 together.

The next step requires good eyesight. Find the broken trace out of Z30, and follow it over the break to a hole on the circuit

board that is plated through. With the IC side of the board facing up, it is directly at the end of the row defined by Z29 and Z30. Make sure you have the right one, because this is where the video input signal goes.

Run a wire from this plated-through hole on the upper side of the board to pins 5 and 13 of ZCOLOR. Both normal and reverse video are now being fed into pins 6 and 7 of Z52, where the video signal is mixed with sync

information and sent out to the monitor.

The next step is to enable the two states. Run a wire from pin 8 of ZFLIP to pin 15 of ZCOLOR. Run a wire from pin 9 of ZFLIP to pin 1 of ZCOLOR. Upon power-up, the flip-flop enables the normal video condition.

By commanding "OUT 254,1" or "OUT 254,0", date line 1 goes low; the Q output of ZFLIP also goes low (pin 8), enabling the other half of ZCOLOR (pin 15),

which sends through the reverse video signal. Notice that both outputs of ZFLIP can never be on at the same time, so either normal or reverse will be active, never both.

Three gates of ZCOLOR remain unused and should be tied off. Run wires connecting pins 6, 10 and 12 to ground (pin 8). One flip-flop of ZFLIP is also tied off by connecting pin 1, 2, 3 and 4 to ground (pin 7). I use this half of the flip-flop, by the way, for controlling lowercase.

Test Your Work

This completes the work inside the TRS-80 for the reverse video mod. Before going into the monitor (stay calm—only one resistor is added), you should test the reverse video circuit. Double check that all wires are connected properly, and make certain that there are no solder balls or splashes and that connections are secure.

Put everything back together, turn on the monitor and power up the computer. The screen

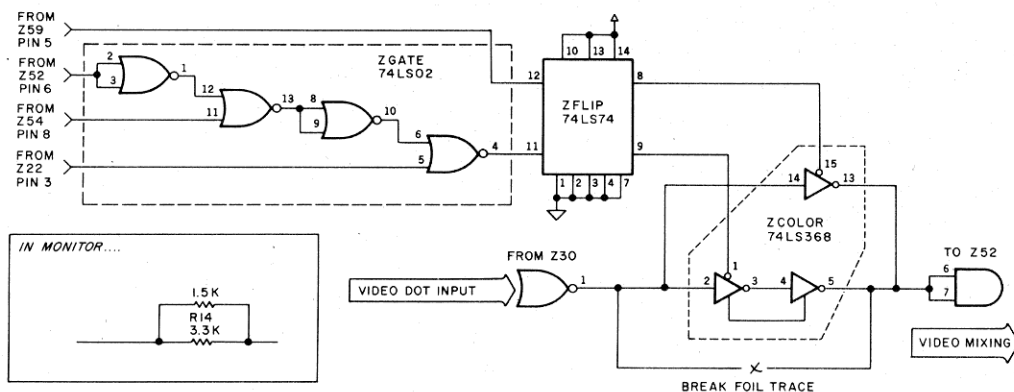


Fig. 1 Schematic

should appear as normal. Key in: OUT 254,0 and ENTER. The screen should reverse, with blackish letters on a squirrel grey-white background. Not too promising, you say? Well, yes, that is exactly what I thought, so I dipped into the monitor to brighten things up.

Okay, turn everything off again. Use a hex nut driver to remove the screws on the back of the video monitor. Easy. Not much inside, is there? \$200, you think regretfully... Enough remorse. Find the plug-in circuit card that, if this were a TV,

would probably be bringing in Saturday Night Live.

Locate resistor R14. The present value should be 3.3K Ohms (orange-orange-red-silver or gold). We have to bring that value down to about 1K. Get a 1.5K Ohm resistor (brown-green-red-silver or gold), and, like the ICs earlier, piggyback it right on top of R14. That's it. Everything back together. Power up, and from now on, text should be easier to read. For me at least, fatigue has dropped considerably. I can sit in front of the machine twice as long. ■

NOTE THE FIRST: Graphics may squirm about on the screen, and letters may show some signs deformation. Another fine monitor design. Ya gotta live with it or get a new fancier monitor.

NOTE THE SECOND, to you high-speed folks. For wiring simplicity, the data lines are not decoded fully, so you have to learn some of the inter-relationships in the OUT statement. This is binary syndrome.

STATEMENT	DATA 1	DATA 2	VIDEO	SPEED
OUT 254,0	0	0	REV	HI
OUT 254,1	0	1	REV	LO
OUT 254,2	1	0	NORML	HI
OUT 254,3	1	1	NORML	LO

Binary Syndrome

DATA BASE MANAGER IDM-IV \$69

You can use it to maintain a data base & produce reports without any programming. Define file parameters & report formats on-line. Features key random access, fast multi-key sort, field arith., label generator, audit log. MOD-II version with more than 50 enhancements \$199.

ACCOUNTS RECEIVABLE ACCT-III \$69

One or more drives. Order entry calculates sales tax, shipping, amount for multiple items. Credit checking, aging, sales analysis, invoices, statements and reports. As opposed to most other A/R, ours can be used by doctors, store managers, etc. MOD-II version \$149.

WORD PROCESSOR 16K \$39. 32K \$49. MOD-II \$49.

First word processor specifically designed for the TRS-80 that uses disk storage for text. Written in BASIC. No special hardware and text limit. Use for letters, manuals & reports. 32K version features upper/lower case without hardware change and multiple input text files.

MAILING LIST advanced MAIL-V \$59.

Fast sort by any field. Multiple labels and reports. 4-digit selection code, new zip code ext., screen input, live keyboard, powerful report writer. MOD-II \$99.

INVENTORY INV-V \$99.

9-digit alphanumeric key for fast key random access. Reports include order info, performance summary, etc. Calculate E.O.Q. Powerful report writer. MOD-II \$149.

All programs are on-line, interactive, random access, virtually bug free, documented and delivered on disks. MOD-I requires 32K, DOS. We challenge all software vendors to offer low cost manuals so you can compare and avoid those high-priced undocumented, 'on-memory' programs. Send \$5 for a MOD-I manual and \$10 for MOD-II.

MOD-II programs are extensively modified, guaranteed to run with 1 year newsletter & updates. 10% off for ordering more than 1 MOD-II programs.

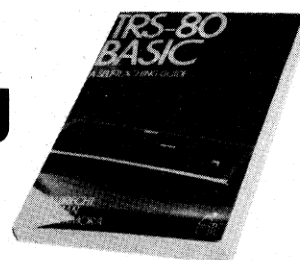
MICRO ARCHITECT ✓54

96 Dothan St., Arlington, MA 02174

Now! The book TRS-80 owners have been waiting for! Everything you need to know for maximum enjoyment of your TRS-80

TRS-80 BASIC A Self-Teaching Guide

Bob Albrecht, Don Inman, & Ramon Zamora



"The book is OUTSTANDING and is perfect for all LEVEL II owners. It is geared toward the beginner, but does contain a wealth of information for more advanced programmers. TRS-80 BASIC teaches all of the BASIC commands through an enjoyable step-by-step approach... TRS-80 BASIC is the best thing to happen to LEVEL II owners!" —TRS-80 Monthly News Magazine

Packed with games, graphics, and practical applications, this eagerly awaited guide leads you step by step to maximum use and enjoyment of your new TRS-80.

336 pp. April 1980 (0 471 06466-1) \$8.95 paper

Get the best in computer instruction from these Wiley Self-Teaching Guides

INTRODUCTION TO DATA PROCESSING, 2nd Ed.

Martin L. Harris in consultation with Nancy B. Stern
1979 (0 471 04657-4) 304 pp. \$5.95

ANS COBOL, 2nd Ed.

Ruth Ashley in consultation with Nancy B. Stern
1979 (0 471 05136-5) 265 pp. \$5.95

BASIC FOR HOME COMPUTERS

Bob Albrecht, LeRoy Finkel, & Jerald R. Brown
1978 (0 471 03204-2) 336 pp. \$7.95

BASIC, 2nd Ed.

Bob Albrecht, LeRoy Finkel, & Jerald R. Brown
1978 (0 471 03500-9) 325 pp. \$7.95

BACKGROUND MATH FOR A COMPUTER WORLD

Ruth Ashley in consultation with Nancy B. Stern.
1973 (0 471 03506-8) 286 pp. \$5.95

JOB CONTROL LANGUAGE

Ruth Ashley & Judi N. Fernandez
1978 (0 471 03205-0) 161 pp. \$5.95

FORTAN IV

Jehosua Friedmann, Philip Greenberg, & Alan M. Hoffberg
1975 (0 471 28082-8) 452 pp. \$6.95

FLOWCHARTING A Tool for Understanding Computer Logic

Nancy B. Stern
1975 (0 471 82331-7) 341 pp. \$6.95

STRUCTURED COBOL

Ruth Ashley
April 1980 (0 471 05362-7)
320 pp. \$8.95

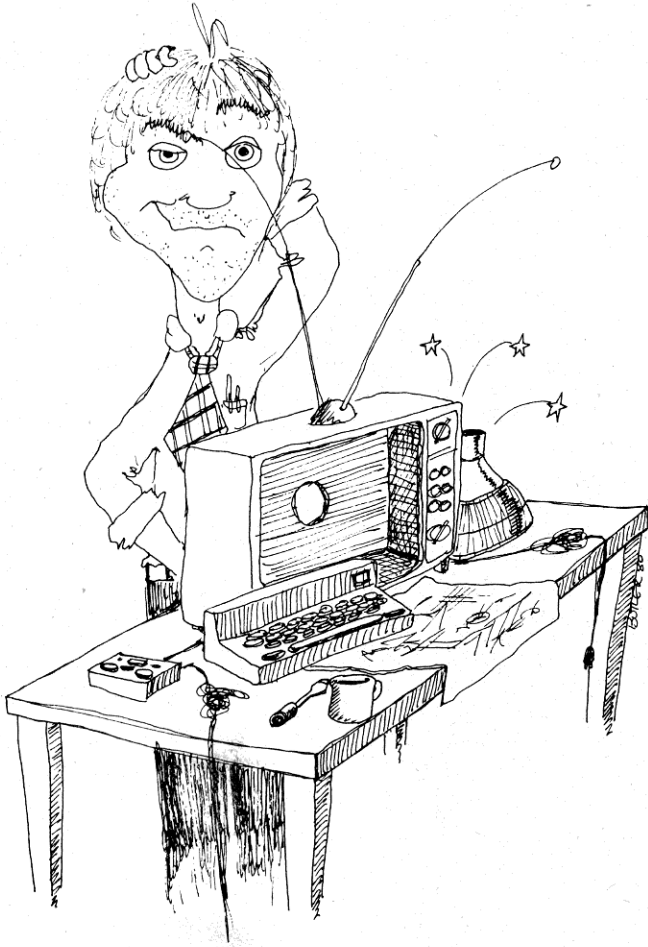
ATARI BASIC

Bob Albrecht, LeRoy Finkel, & Jerald R. Brown
1979 (0 471 06496-3) 333 pp. \$5.95

Look for them at your favorite book shop or computer store.



JOHN WILEY & SONS, Inc., 605 Third Avenue, New York, N.Y. 10016
In Canada: 22 Worcester Road, Rexdale, Ontario. Prices subject to change without notice
✓192 0-7609



Hugo Jackson
31 Laurie Court
Kanata, Ontario
Canada K2L1S2

At the time I bought my TRS-80 nothing annoyed me more than laying out over \$300 for a video monitor that couldn't even pick up Mork & Mindy between For-Next loops. (American readers can take some comfort in the fact that they are paying substantially less for the same equipment.)

A close examination of the Radio Shack video monitor revealed a stripped down black and white television, minus antenna and channel changer. I could have bought the same set for about \$100 less than I had to pay for the TRS-80 television with half the parts missing.

While I can appreciate that the Radio Shack video monitor is, generally, going to give far superior results than any homebrew setup, a summer of lugging the intrinsically fragile video monitor back and forth from an island cottage had become a tiresome and unnerving experience.

Groping for Change

To a man of means the solution would have been obvious, simply buy an extra monitor for the cottage. But when you consider that I was forced to draw loans discreetly from my son's piggy bank and grope wildly under chair cushions for loose change, to make my original purchase, you can appreciate my inability to raise the capital required for such an expenditure.

The answer seemed to be hooking into an inexpensive black and white television.

Mork & Mindy Monitor

But to compound my problem, my knowledge of electronic hardware is negligible. While I have soldered a few resistors in my time and have put together the odd patch cord, in a pinch I would seriously doubt my ability to correctly apply Ohm's law.

I tried to console myself with the thought that the mystical device I needed was bound to be offered in a computer magazine and I spent many unsuccessful evenings sifting through back issues expecting to see an advertisement promising the solution to my problem.

I understand now that a number of products are available that would have been suitable, but being the electronics whizz that I am—manufacturers take note—unless the advertisement had read: "Hugo Jackson, this is what you need to hook up your TRS-80 to an ordinary television" I would have passed it by rather than take the financial risk that it was not what I wanted.

So, for some time my widely uninformed, yet (I like to think) creative mind, began to wander fruitlessly in search of a solution.

What Goes Up, Must be Pong

The impetus for my original experiment was triggered by an event not unlike the one which led Newton to hypothesize about gravity, except my apple was an old video pong game, suddenly dislodged from its precarious perch on a bookshelf that crashed down on my head.

I'd like to report to you that the result was a thoughtful synthesis, both immediate and earth shattering but such was not the case.

It was not until I had kicked the game across the room and found myself picking up its pieces did all the ones in my head begin to fit together.

There in my hands was the little metal box that the game's instructions had been so insistent that I attach to the antenna terminals of my television set.

"Surely," I reasoned, "all that's required is to hook up the video output from my computer to the input of this box and voila, any television set can be an extension of my computer."

Having purchased one of those fancy DIN plug connectors and some hookup wire from Radio Shack I confidently

headed off to the cottage the next day with only my keyboard and tape recorder.

My wife is patient and understanding, but having absorbed the devastating results of my attempts to fix her toaster, refrigerator and washing machine (which necessitated the purchase of a new toaster, refrigerator and washing machine) she was not overjoyed to see me salivating over our cottage television with a screwdriver in one hand and soldering iron in the other.

I assured her that all I wanted to do was adjust the fine tuning and though she didn't believe me, she said no more.

It took only fifteen minutes to hook it up and, as I stared at the blank screen, to realize my logic wasn't all that air-tight. The result of my experiment scared me; I hadn't made such an error in logic since I had tried fixing the washing machine.

I quickly removed all the gadgetry from the television and turned it on saying a silent prayer. Words cannot express my relief when neither the television nor the computer began unexplainably to spin dry and seemed unaffected by my half-crazed inventiveness.

Fred: Friend to Proton

Fortunately for the computer, television and myself, deliverance was a short time coming. My friend Fred (properly tutored in the mysterious way of protons and electrons), explained to me that the little metal box from the video game was nothing more than a capacitor—or did he say resistor?—whose sole purpose was to equalize the impedance between the video game's output and what a television set uses.

What I had been trying to do was feed my television what is called 'raw' video, something for which it has no appetite. As Fred explained it, I had two options. The first was to go inside of the television and feed it the raw video at a point in its circuitry where it is able to digest it.

The second option was to construct an interface which converts raw video from the

computer to an RF (radio frequency) signal that the television would accept like any other channel and re-convert it to raw video for its own output.

The first option was discarded immediately; I had learned my lesson and was convinced that the FCC had me specifically in mind when they stamped the back panel of my set: "CAUTION. To prevent electric shock DO NOT REMOVE COVER. Refer servicing to QUALIFIED service personnel."

But the second proposal put me no closer to the solution. Although Fred is blessed with the technical know-how required to assemble such an interface, his exasperation with my electronic inability has resulted in his firm refusal to help me in any projects I undertake.

Feeling quite despondent and blaming, equally, Radio Shack, Fred and the dog for my predicament, I found myself leafing through the Radio Shack catalogue, my thoughts having turned to selling the computer and buying a new stereo with the proceeds. It was then I saw—in a rather obscure location—Radio Shack's "TV RF Modulator Interface." It was in their "Project Boards" section.

A previous encounter with one of these "project boards" had left me bitter. I once invested \$4 for a printed circuit board and instructions for a digital alarm, which—as it turned out—cost an additional thirty-five dollars in parts to

make work. I wrote the \$4 off and bought an off-the-shelf model for \$15.95.

Accustomed to disappointment, and suspicious of the Modulator's description, which appeared to me to be very vague and non-specific. I kept my pulse under control, as I ran to the car and drove off to the nearest Radio Shack.

I Learn to Dance

I was jubilant when the store manager graciously allowed me to inspect the parts list prior to my purchase. There I spied on page two of the project board's instructions a section entitled "TRS-80 Adaptation." I oscillated between tears of joy and verbal outbursts of "It'll work. It'll work!"

Oblivious to the time and refusing all offers of aid, I danced around the store checking off the parts list, loading my arms with all the necessary resistors and capacitors. It was a full hour after the regular closing time when I finally let the manager go home.

All totaled the project board and additional parts cost sixty-five dollars and fifty-one cents (taxes included) and though the package was intimidating I began construction immediately.

Roughly six and one-half hours later I emerged from my room with that great mountain of parts reduced to the contents of a 6 x 4 x 2-inch box. With an understandable degree of trepidation I connected all the cables

in the manner prescribed and could barely deal with my surprise when the thing worked the first time.

Let's be honest. You're just as surprised that it worked too. From my experience I can state with certainty that even those of you with a severely limited intelligence and a manual dexterity that might fail to seal an envelope on the first try will meet with equal success.

Obfuscation Defied!

But don't tell Tandy Corporation. Radio Shack has long been justly criticized for untrained and unknowledgeable store personnel, but now it appears that the company is allowing at least one of them to moonlight as an instruction manual writer.

Apart from the stilted, awkward narrative, the step sequence is confusing and hard to follow. One typographical error requested that I solder the 0.00 uf capacitor in place. What is really sad is that I spent a good ten minutes looking for it (the instructions should read the 100 uf capacitor).

Despite Radio Shack's apparent desire to make it otherwise, the kit is easy to assemble, as long as common sense prevails.

A final note: The instructions do warn that you might not enjoy good legibility in the 64 characters/line format, but as you can see from Photo 1 the 32 characters/line format yields acceptable results.

The TV I used for this picture was a 24" black and white Hitachi portable. Experimenting with other smaller sets has resulted in clarity even in the 64 characters/line mode.

The fact remains that I have yet to find any set that gives the quality of character definition comparable to the TRS-80 monitor and my annoyance with having to buy it in the first place has somewhat abated.

All in all, the project interface board is an excellent way to give portability to your computer. And, if you're still saving nickels and dimes for your first system, the economy of the interface over the TRS-80 monitor may well put a computer within your grasp. ■

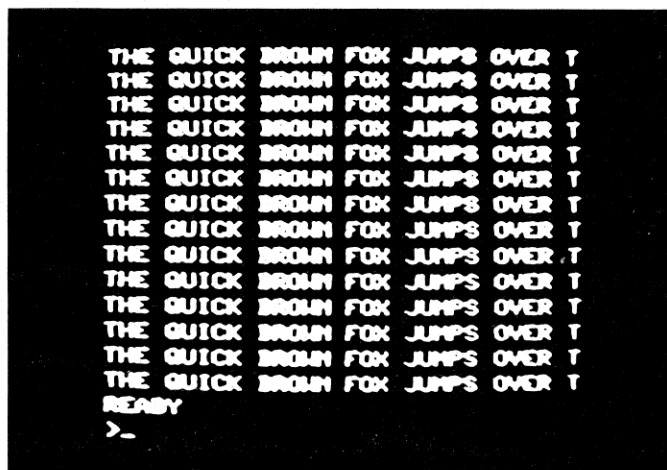
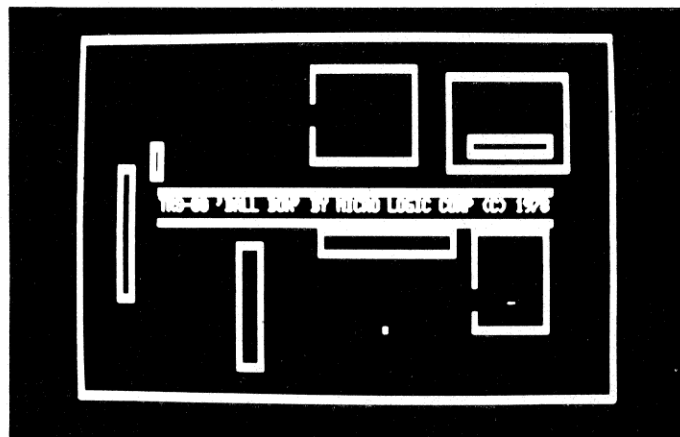


Photo 1: Showing the resolution of the 32 character per line format on a 24" black and white portable television.

A mini universe complete with black holes.

Ball Box



Ball Box graphics.

James D. Lewis, Pres.
Micro Logic Corp.
Box 174
Hackensack NJ 07602

journeys about its limited universe. In most versions, Squot's creativity will dissipate as it runs out of new paths and starts its tour of its environment on a previously taken route.

A non-interactive game called Ball Box is based on the exciting adventures of Squot. However, to make things a bit more interesting than Pong Squot, Squot's universe includes three different types of objects that add a little scenery: boxes, doorways and slides. Boxes are rectangles of various dimensions. Doorways are openings within a

Have you ever closely watched a video pong game in its dormant phase between games? The path taken by the little sliding "Squot" (square dot) may change as it

Program listing.

```
1000 REM *****
1010 REM *
1020 REM * NAME: 'BALL BOX'
1021 REM *
1030 REM * PURPOSE: SIMULATION OF A
1040 REM * MINI UNIVERSE
1050 REM * BY: JAMES LEWIS
1060 REM * MICRO LOGIC CORP.
1070 REM * BOX 174
1080 REM * HACKENSACK, NJ
1090 REM * 07602
1091 REM * FOR: TRS-80 LEVEL I
1098 REM *
1099 REM *****
2000 CLS
2010 PRINT AT 65;
3000 FOR I = 0 TO 127
3001 SET(I,0)
3002 SET(I,47)
3003 NEXT I
3010 FOR I = 0 TO 47
3011 SET(0,I)
3012 SET(127,I)
3013 NEXT I
3040 FOR I = 20 TO 94
3050 SET(I,20)
3051 SET(I,24)
3060 NEXT I
4000 FOR I = 1 TO 8
4100 L = 30
4110 M = L / 1.6
4200 R = RND(128-L-4) + 3
4210 S = R + RND(L) + 1
4220 T = RND(48-M-4) + 3
4230 U = T + RND(M) + 1
4310 FOR J = R TO S
4320 IF POINT(J,T) = 1 THEN 4200
```

```
4330 IF POINT(J,U) = 1 THEN 4200
4340 NEXT J
4400 FOR J = T TO U
4410 IF POINT(R,J) = 1 THEN 4200
4420 IF POINT(S,J) = 1 THEN 4200
4430 NEXT J
4600 FOR J = R TO S
4601 SET(J,T)
4602 SET(J,U)
4603 NEXT J
4700 FOR J = T TO U
4701 SET(R,J)
4702 SET(S,J)
4703 NEXT J
4800 NEXT I
4900 PRINT AT 64*7+10;
4910 PRINT "TRS-80 'BALL BOX' BY MICRO LOGIC CORP.";
4920 PRINT AT 64*3+10;
4930 PRINT " ";
4940 PRINT AT 64*11+28;
4950 PRINT " ";
5000 X = RND(128-4) + 2
5001 Y = RND(128-4) + 2
5005 C = 0
5010 A = +1
5011 B = +1
5020 IF POINT(X,Y) = 1 THEN 5000
5100 RESET(X,Y)
5110 X = X + A
5111 Y = Y + B
5120 IF POINT(X,Y) = 1 THEN 6000
5130 SET(X,Y)
5140 C = C + 1
5150 IF C < 1500 THEN 5100
5160 GOTO 2000
6000 IF POINT(X,Y-B) = 0 THEN B = -B : GOTO 5110
6010 IF POINT(X-A,Y) = 0 THEN A = -A : GOTO 5110
6020 A = -A
6030 B = -B
6040 GOTO 5110
```

rectangle that allow Squot to enter the interior of a rectangle, which is called a room. Slides are closely spaced parallel lines that allow Squot to travel horizontally or vertically rather than diagonally.

Squot simply travels in straight lines bouncing off any objects in its way at the natural 45 degree angle. But don't let these simple rules make Squot's adventures seem dull. Try it and see.

There are a few theories about Squot's trips. One example is: If Squot enters a room via a doorway, it will eventually leave the room (or find a black hole). See if you can prove this or find other theories.

Squot's universe is designed as follows.

1. Universe limits are drawn by placing a rectangle at the outer edge of the CRT.

2. The main slide is drawn across the center of the universe.

3. Next, random size and shape boxes are scattered

about the universe without overlapping, although they may touch. Two boxes that are near each other can create a slide.

4. Then food for Squot is sprinkled along the main slide. Note that Squot will eat any characters in its path.

5. Finally, doorways are cut into some of the boxes to create rooms for Squot to explore.

Squot is then placed at a random point in its universe and nudged to move in one of the four diagonal directions. After Squot has had the time to get to know its surroundings, it is suddenly surprised to find itself through a black hole into another universe!

The program listing is written in Level I TRS-80 BASIC. We will be glad to send you a tape with both Level I and Level II versions if you do not want to key it in by hand. Included with the tape and instructions is a more complete Squot language dictionary. Send \$4.90 to Micro Logic Corp., Box 174, Hackensack NJ 07602. ■

STOP PLAYING GAMES

TRS-80 (Level II)
PET
APPLE
OTHERS



- Calculate odds on HORSE RACES with ANY COMPUTER using BASIC.
- SCIENTIFICALLY DERIVED SYSTEM really works. This system was written and used by computer experts and is now being made available to home computer owners. This method is based on storing data from a large number of races on a high speed, large scale computer. 23 factors taken from the "Daily Racing Form" were then analyzed by the computer to see how they influenced race results. From these 23 factors, ten were found to be the most vital in determining winners. NUMERICAL PROBABILITIES of each of these 10 factors were then computed and this forms the basis of this REVOLUTIONARY NEW PROGRAM.
- SIMPLE TO USE: Obtain "Daily Racing Form" the day before the races and answer the 10 questions about each horse. Run the program and your computer will print out the odds for all horses in each race. COMPUTER POWER gives you the advantage!
- YOU GET: 1) TRS-80 (Level II) Cassette
2) Listing of BASIC program for use with any computer.
3) Instructions on how to get the needed data from the "Daily Racing Form".
4) Tips on using the odds generated by the program.
5) Sample form to simplify entering data for each race.

-----MAIL COUPON OR CALL TODAY-----
3G COMPANY, INC. DEPT. 80 205 (503) 357-9889
RT. 3, BOX 28A, GASTON, OR 97119

Yes, I want to use my computer for FUN and PROFIT. Please send me _____ programs at \$19.95 each.

Enclosed is: ☐ check or money order ☐ Master Charge ☐ Visa

Card No. _____ Exp. date _____
NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

**START USING YOUR COMPUTER FOR
FUN and PROFIT!**

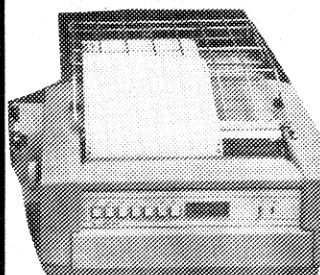


RONDURE COMPANY

2522 BUTLER ST
DALLAS, TEXAS 75235
214-630-4621

the computer room

SPECIAL Printer for your Microcomputer



Will run on serial RS232 port of
most micros including TRS-80.

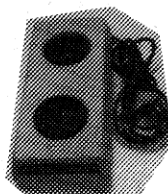
\$450.00

GE TERMINET 300 PRINTER

Pin feed—9" paper

- 80 Print positions
 - Receive only
 - ASCII code
 - RS-232 interface
 - 30 CPS
 - Upper & lowercase
 - Shipping wt. 75#
- Shipping containers \$15.00.
(used)
(good working condition)

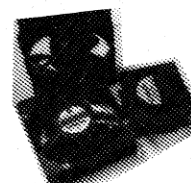
WE HAVE FLAT-PACK ACOUSTIC



Modem
pickup

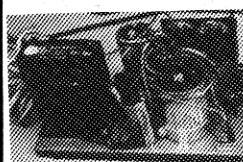
\$19.50

USED FANS



Muffin—8.00
Sprite—4.00

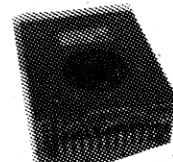
NEW POWER SUPPLY



5V at 3 Amp
12V at 6 Amp
-12V at 3 Amp

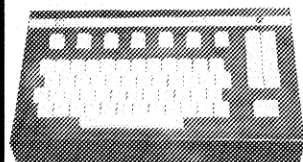
\$25.00

USED POWER SUPPLY



5V at 12 Amp
16V at 6 Amp
6V at 2 Amp

\$15.00



ASCII Keyboard

(used)
with enclosure

SALE \$15.00

MICRO SWITCH KEYBOARD USED BUT LOOKS VERY NICE



ASC II

\$40.00
(With Print)

USED OMNITEK



ORIG.
ONLY
95.00

ORDERING INFORMATION:

We ship the same day we receive a certified check or money order. Texas residents add 5% sales tax. Please call if you have a question. Write for our CATALOG of many parts, terminals, printers, etc. All items subject to availability. Your money returned if we are out of stock.

SHIPPING INFORMATION:

Modems: \$25.00 each; Key Boards \$3.50, Power Supply \$5.00. Large items & Parts: Specify Freight or Air Freight Collect. Foreign Orders: Add appropriate freight or postage. We now take Master Charge and Visa orders. Specify full number, bank number and expiration date.

*Find out how to convert
your Level II object tapes to Level I CLOADable format.*

Level II to Level I

Mike Wolf
Wolf and Associates
P.O. Box 8073
La Crescenta CA 91214

Those of you who have Level
I TRS-80s and do your own

assembly language programming are probably bugged by two things: your completed assembly language programs cannot be loaded with the CLOAD command; loading at the higher, 500 baud rate increases your load error rate (sometimes very significantly).

To load assembly language programs, you first load the SYSTEM tape (which emulates the SYSTEM mode of Level 2 BASIC) at 250 baud using the CLOAD command, and then reset the volume levels and load your program at 500 baud. This is hassle enough, but if you get the ominous "C" in the upper right-hand corner of the screen (meaning checksum error), then you must go all the way back and reload the SYSTEM tape again. This finally bugged me enough so that I did something about it: I wrote a program that converts Level 2 assembly language tapes to Level 1 format.

Program Features

The program can copy any of the binary tapes produced by your assembler to 250 baud, Level I format (meaning that you can share your assembly language software with friends that don't have Level II or the SYSTEM tape. It also means that you won't have to use the SYSTEM tape anymore to load your programs.) It copies Level II format assembly language tapes over to Level I format, so that you can load them with CLOAD command.

The program is structured so that multiple copies are easily made and further, resides in "high core" (from 7EC4H to 7FFFH). This leaves the maximum amount of memory avail-

able for your program.

An assembly-language source listing of the program (named "DUMP") is shown in the Program Listing. If you assemble the program using the WE option, the listing will halt at an error, allowing you to note it. I also set the NS option (no symbol table), as the symbol table will scroll the error summary at the end of the listing off the screen. (All this is unnecessary if you have a line printer, which I don't.) The command looks like this: A DUMP/WE/NS.

This will assemble the program with the file name DUMP. If you get errors, check your listing carefully against the Program Listing. If it has assembled without error, it will print READY CASSETTE. Load a fresh cassette, hit ENTER and the assembler will dump the program, in binary form, onto your tape.

Converting Assembler/Editor

Now, as an example, let's use the program to make a 250 baud, Level 1 format version of the Assembler/Editor, that we can load with the CLOAD command of Level 1 BASIC. First, you must load the SYSTEM tape; this will print its prompt symbol *. Now put the Level 2 program cassette that you want to convert into the recorder (in this example, the Assembler/Editor tape). Put the recorder into play and type in the file name (in this case,

Program Listing.

```
00010 ; LEVEL-2 TO LEVEL-1 ASSEMBLY LANGUAGE CONVERSION ROUTINE
00020 ;
00030 ; WRITTEN BY MIKE WOLF, IN Z-80 ASSEMBLY LANGUAGE
00040 ;
00050 ; THIS ROUTINE WILL CONVERT OBJECT TAPES PRODUCED
00060 ; BY THE RADIO SHACK ASSEMBLER TO LEVEL-1 FORMAT
00070 ; SO THAT THEY CAN BE LOADED WITH THE "CLOAD"
00080 ; COMMAND OF LEVEL-1 BASIC. ANY ASSEMBLY LANGUAGE
00090 ; PROGRAMMER (USING EITHER A LEVEL-1 OR LEVEL-2
00100 ; MACHINE) WILL DEFINITELY NEED THIS PROGRAM IF HE
00110 ; OR SHE WISHES TO PRODUCE PROGRAMS FOR LEVEL-1
00120 ; CUSTOMERS.
00130 ;
00140 ;
00150 ;
00160 ;
00170 ;
00180 ;
00190 ;
00200 ;
00210 ;
00220 ;
00230 ;
00240 ;
00250 ;
00260 ;
00270 ;
00280 ;
00290 ;
00300 ;
00310 ;
00320 ;
00330 ;
00340 ;
00350 ;
00360 ;
00370 ;
00380 ;
00390 ;
00400 ;

7EC4 00100 ORG 7EC4H
0F4B 00110 CSAVE EQU 0F4BH ;ROUTINE TO DUMP MEMORY TO TAPE
0FE7 00120 CTON EQU 0FE7H ;ROUTINE TO TURN ON CASSETTE
0B40 00130 SCAN EQU 0B40H ;ROUTINE TO SCAN KEYBOARD
7EC4 31C37E 00140 DUMP LD SP,0 ;INITIALIZE STACK HERE-1
7EC7 3E20 00150 LD A,20H ;LOAD A-REG WITH ASCII BLANK
7EC9 11003C 00160 LD DE,3C00H ; START OF VIDEO BUFFER
7ED2 21FF3F 00170 LD HL,3FFFH ; END OF VIDEO BUFFER
7EDF C0507F 00180 CALL SETBLK ;CLEAR SCREEN
7ED2 2A407F 00190 LD HL,(ASC1) ; PRINT "LD="
7ED5 22003C 00200 LD (3C00H),HL
7ED8 2A407F 00210 LD HL,(ASC2)
7ED8 22023C 00220 LD (3C02H),HL
7EDE 01043C 00230 LD BC,3C04H ; SET CURSOR POSITION
7EE1 ED436840 00240 LD (4068H),BC
7EE5 C0A07F 00250 CALL INP4 ; READ LOW ADDRESS
7EE8 22507F 00260 LD (LOW),HL ; STORE IN LOCATION "LOW"
7EEB 2A407F 00270 LD HL,(ASC3) ; PRINT "HI="
7EEC 22403C 00280 LD (3C40H),HL
7EF1 2A517F 00290 LD HL,(ASC4)
7EF4 22423C 00300 LD (3C42H),HL
7EF7 01443C 00310 LD BC,3C44H ; SET CURSOR POSITION
7EFA ED436840 00320 LD (4068H),BC
7EFE C0A07F 00330 CALL INP4 ; READ HIGH ADDRESS
7F01 22507F 00340 LD (HIGH),HL ; STORE IT IN "HIGH"
7F04 2A537F 00350 LD HL,(ASC5) ; PRINT "XFER="
7F07 22803C 00360 LD (3C80H),HL
7F0A 2A557F 00370 LD HL,(ASC6)
7F0D 22823C 00380 LD (3C82H),HL
7F10 01843C 00390 LD BC,3C84H ;SET CURSOR POSITION
7F13 ED436840 00400 LD (4068H),BC
```


Add sound to your computer

by CAP Electronics

* TRS-80 is a trademark of Tandy Corp.

Let your TRS-80 sing!

Cassette \$14.95

Cassette w/ speaker-amp \$29.95

from CLOAD Magazine

Mail File

A professional mailing list program requires thorough documentation and support by the publisher. Galactic Software provides 30 pages of documentation in a three ring binder and updates to registered owners.

Each record consists of name, address, phone, and category codes. With the proper codes, thousands of sublists are possible. And, editing is simple.

For TRS-80 Model II \$199.00



by Cindy and Andrew Bartorillo
Learn a foreign language with the
aid of your computer. This
advanced, language teaching program
contains in excess of 500 phrases,
800 word vocabulary and 1600 verb
conjugation forms. Switch between
the foreign language to English and
English to the foreign language.
Print multiple choice question and
answer test. So complete it had to
be put on disk and requires 32k of
memory. The choice is yours.

FRENCH	\$19.95	ITALIAN	\$19.95
GERMAN	\$19.95	SPANISH	\$19.95

by Karl Savon from Havden

Start the baseball season now!

No peanuts included. \$10.95.



by K Pfeiffer from Micro-Fantastic
Challenging word game where you try
to determine one of the over a
thousand words. One or two
players. \$14.95

by Greg Hassett from Mad Hatter
Two new Adventures. Discover the
lost world of Atlantis or the
mysteries of the Isle.
Atlantis. \$12.95
Enchanted Isle. \$12.95

from Instant Software
Fly into the early days of aviation
history. With only 26 gallons of
fuel you attempt to land in Chicago
after leaving far off Columbus,
Ohio. \$7.95

from The Software Association
The fascinating program based on
the famous "Eliza" and "Doctor"
programs. Simply talk with Dr.
Chips who will immediately analyze
your sentences and talk back to
you. Though not to be taken too
seriously, Dr. Chips makes good
conversation. \$14.95

by Chamberlin and Yates from Microsoft. The "PLUS" in assembly language programming has arrived. If you have reached the limits of editor/assembler or were always a little awed by assembly, then Microsoft's version is for you. You not only get the features found in their Radio Shack version, but also included are the debugging features of TBUG and more. This will make your programming, editing and debugging easier, more efficient and more enjoyable.

For 16k tape system \$29.95

Disk based system to be announced.

from Cottage Software

Ever want to change every PRINT to LPRINT? Or vice versa? This machine language utility will modify any program in seconds. Make full use of your computer. \$8.95

from Disco-Tech

Six machine language routines with complete and thorough documentation. Add both keyboard debounce and repeat, upward scrolling, and downward scrolling. The formatted input routine provides specified field length, screen location and data input. The shift and delete, and the shift and insert routines add even greater editing capability to the TRS-80. \$24.95

from Small System Software

This program provides full Level I BASIC capability in any Level II, 16k TRS-80. Plus it adds the printing commands of LPRINT and LLIST so you can now list your programs and control your printer from Level I BASIC. Two new commands, LPRINT ON and LPRINT OFF allow you to print anything that is displayed on the screen. Using only 4k of RAM, you have 12k for your Level I programs. Any Level I BASIC program or data tape may be used without conversion. All commands and abbreviations supported.

\$19.95



THE PROGRAM STORE
4200 Wisconsin Ave NW
PO Box 9609 Dept K '7
Washington, D.C. 20016

YES please send me these TRS-80 programs:

[illegible]

name:

address: _____
city, state
& code

code

☐ Check payable to The Program Store

☐ MASTERCHARGE mc bank code:

☐ VISA exp date:

card number:

signature:






YES

OUR PRODUCTS WILL ADD A NEW
DIMENSION TO YOUR TRS-80™

IMPORTANT: All our products are:
-fully assembled, tested and guaranteed
-supplied with their own power supply
-shipped with all necessary cables & connectors
-used with Level II BASIC in and out command

•EXPANDABUS \$80

Now you can hook up to 5 accessories to the TRS-80 Bus. Can be chained if more than 5 are needed. Not a loose board! 1

•INTERFACER 2 \$85

16 channel I/O module, 8 inputs, 8 outputs, 2 relays, 2 opto-isolated inputs. Very easy to use with BASIC. Extensive user's manual included. Sold worldwide for over a year. 2

•BLIPPO 15 tones 3 octaves \$39

The only low cost true synthesizer. Uses BASIC. Generates its own tones and does not tie up the TRS-80. Up to 10 notes per second. Built-in power supply and speaker. Now it's easy to add sound to any program. 3

•ANALOG 80 \$112

8 channel ANALOG TO DIGITAL converter. Anything that can be electrically measured can be interfaced to your TRS-80 - voltage, current, temperature, pressure, light level, No assembly language needed. 4

•DAC 80 \$94

DIGITAL TO ANALOG module. 8 Bit 5% accuracy. Latest technology. Use to synthesize wave forms, program power supply, control motor speed or light levels.... 5

TO ORDER: Send check or M.O. Add \$3 for S & H. PHONE ORDERS: (212) 296 5916 N.Y. RES ADD TAX

Alpha Product Co. 85-71 79th St. Woodhaven NY 11421

TRS-80™ is a trademark of Tandy Corp

ALPHA ²¹⁰ product company
85-71, 79th ST., WOODHAVEN, N.Y. 11421 (212) 296-5916
enclose 50¢ P&H

I would like information on 1 2 3 4 5 6

Name (print) _____

Address _____

City _____

State _____ Zip _____

EDTASM), then hit ENTER. SYSTEM loads the program, and when done, will type an *.

Now put your DUMP tape into the recorder as you did with the Assembler/Editor tape and type: DUMP (ENTER). SYSTEM loads the DUMP program.

When it's through and it prompts you with an *, you must type (ENTER) to execute DUMP. This is because DUMP was assembled with the immediate start option (the start address immediately followed the END statement).

The first thing DUMP does is clear the screen and type out LO= to which you must respond with the hexadecimal address where dumping is to start (in this case, 41FEH). Then the program types HI= to which you must respond with the hex address where dumping is to stop (in this case 6800H). The program next types XFR= to which you must respond with the hex address where execution is to begin (in this case, 468AH). When the program types R?, and waits for you to press ENTER, load a fresh cassette and begin recording.

The program will not print any non-hexadecimal character that is typed (a non-hexadecimal character is one that is not the digit 0-9 or the letter A-F). If you make an error typing, just type the correct four digits in over again; the program ignores any but the last four digits typed, before the enter key is pressed.

After you have pressed ENTER in response to R?, the selected area of memory is dumped onto your cassette. You are now the proud owner of a 250 baud version of the Assembler/Editor, that you can load with the CLOAD command of Level 1 BASIC. This can be done with any Level 2 assembly language tape. Just replace the Assembler tape in the example given above with your own. You'll need to know the lowest address in memory used by the program (LO); the highest address it uses (HI); and the entry point (starting address) of the program (XFR).

Since DUMP loops back to the beginning question LO= after completion, you can make mul-

multiple copies by simply repeating the process.

Programming Details

The main routine named DUMP originates at 7EC4H and initializes a stack at 7EC3H. DUMP clears the screen by calling the subroutine SETBLK. SETBLK is a general purpose routine that initializes a block of memory to a constant. To clear the screen ASCII code for blank must be put into the video buffer (located at memory locations 3C00H to 3FFFH). SETBLK expects to find the number that it is to store in memory to be in the A-register; it expects the low memory address to be in the DE register, and the high memory address in the HL register.

Accordingly, DUMP puts the ASCII code for blank (20H) in the A-register, the lower address of the video buffer (3C00H) in the DE register, and the upper address (3FFFH) in the HL register, before calling SETBLK. DUMP then prints out LO= on the screen and calls a routine (INP4) that reads a four digit hex number from the keyboard. The number is converted to hexadecimal from ASCII, and returned in the HL register. DUMP then stores this in a temporary location, prints out HI=, calls INP4 as before, and so on until the three necessary addresses have been read in from the keyboard and stored in temporary locations.

When the transfer address is read in XFRE=, then the DUMP program must set up the address to which control must pass after loading. It does this by putting the transfer address in the locations 41FEH, 41FFH. This is the top of the stack that BASIC uses, and is the location used by the return instruction CLOAD will use when it is through. If these locations are altered by the loading process (for example by loading into them) then when loading is through, control will not pass back to BASIC, but instead to the location pointed to by 41FEH, 41FFH. For this reason, the low address that you type must be equal to or less than 41FEH. If not, control will pass back to BASIC after loading,

7F17 C0A7F	00410	CALL	INP4	; READ START ADDRESS	
7F1A 7D	00420	LD	A:L	; STORE IT IN 41FE, 41FF.	
7F1B 32FE41	00430	LD	(41FEH):A		
7F1E 7C	00440	LD	A:H		
7F1F 32FF41	00450	LD	(41FFH):A		
7F22 2A57F	00460	LD	HL:(ASC7);	PRINT "R?"	
7F25 22C03C	00470	LD	(3CC0H):HL		
7F28 01C23C	00480	LD	BC:3CC2H		
7F2B ED436840	00490	LD	(4068H):BC		
7F2F C0A00B	00500	CALL	SCAN	; SCAN KEYBOARD	
7F32 CA257F	00510	JP	Z:KEY	; LOOP IF NO KEY PRESSED	
7F35 FE0D	00520	CP	0DH	; IS IT A CARRIAGE RETURN	
7F37 C2257F	00530	JP	NZ:KEY	; NO, LOOP	
7F3A C0E90F	00540	CALL	CTON	; YES, TURN ON CASSETTE	
7F3D 2A507F	00550	LD	HL:(LOW);	SET UP LOW AND HIGH DUMP	
7F40 ED5897F	00560	LD	DE:(HIGH);	ADDRESSES FOR CSAVE	
7F44 13	00570	INC	DE	; CSAVE WANTS LAST ADDR+1	
7F45 C0A00F	00580	CALL	CSAVE	; DUMP TO TAPE	
7F48 C3C47E	00590	JP	DUMP	; DO IT ALL OVER AGAIN (LOOP)	
7F4B 4C	00600	ASC1	DEFN	'LD'	
7F4C 4F	7F4D 57	00610	ASC2	DEFN 'M'	
7F4E 3D	7F4F 48	00620	ASC3	DEFN 'H'	
7F50 49	7F51 20	00630	ASC4	DEFN 'E'	
7F52 3D	7F53 58	00640	ASC5	DEFN 'X'	
7F54 46	7F55 52	00650	ASC6	DEFN 'R'	
7F56 3D	7F57 52	00660	ASC7	DEFN 'P'	
7F58 3F	0002	00670	HIGH	DEFS 2 ; HIGH ADDRESS	
0002	00680	LOW	DEFS 2	; LOW ADDRESS	
7F5D 32777F	00690	SETBLK	LD	(TEMP):A ; ROUTINE TO SET BLOCK OF MEMORY -> TO A CONST.	
7F60 37	00700	SCF		; SET CARRY FLAG	
7F61 3F	00710	CCF		; COMPLEMENT CARRY FLAG	
7F62 1B	00720	DEC	DE	; ADDS ONE TO RESULT OF SUBTRACTION	
7F63 ED52	00730	SBC	HL:DE	; CALCULATE BYTE COUNT	
7F65 22787F	00740	LD	(BYTECT):HL	; SAVE BYTE COUNT	
7F68 ED40787F	00750	LD	BC:(BYTECT)	; PUT IT INTO BC-REG	
7F6C 13	00760	INC	DE	; RESTORE DE-REG	
7F6D 21777F	00770	LD	HL:TEMP	; PUT ADDR. OF CONST. IN HL-REG	
7F70 ED00	00780	LOOP	LDI	; DO BLOCK TRANSFER	
7F72 2B	00790	DEC	HL	; KEEP SOURCE ADDR. CONST.	
7F73 EA707F	00800	JP	PE:LOOP	; LOOP UNTIL DONE	
7F76 C9	00810	RET		; RETURN TO CALLER	
0001	00820	TEMP	DEFS 1	; TEMP STORAGE	
0002	00830	BYTECT	DEFS 2	; BYTE COUNT	
7F7A 32777F	00840	ASCII	LD	(TEMP):A ; ROUTINE TO CONVERT ASCII TO BINARY	
7F7D D630	00850	SUB	30H		
7F7F FA087F	00860	JP	M:NONUM	; IF LESS THAN 30H, NOT A NUMBER	
7F82 3A777F	00870	LD	A:(TEMP)	; RESTORE A-REG	
7F85 D647	00880	SUB	47H		
7F87 F2A87F	00890	JP	P:NONUM	; IF GREATER THAN 47H, NOT A NUMBER	
7F8A 3A777F	00900	LD	A:(TEMP)	; RESTORE A-REG	
7F8D D641	00910	SUB	41H		
7F8F F29A7F	00920	JP	P:OK	; ITS A NUMBER	
7F92 3A777F	00930	LD	A:(TEMP)	; RESTORE A-REG	
7F95 D63A	00940	SUB	3AH		
7F97 F2A87F	00950	JP	P:NONUM	; IF BETWEEN 3AH AND 40H, ITS NOT A NUMBER	
7F9A 3A777F	00960	OK	LD	A:(TEMP)	; BRANCH HERE IF ITS A VALID NUMBER
7F9D C877	00970	BIT	6:A	; IS BIT 6 SET?	
7F9F C2A57F	00980	JP	NZ:SUB37	; YES, SUBTRACT 37H AND RETURN	
7FA2 E60F	00990	MSK45	AND	0FH	; AND, MASK OUT 4 MSB AND RETURN
7FA4 C9	01000	RET			
7FA5 3A777F	01010	SUB37	LD	A:(TEMP)	
7FA8 D637	01020	SUB	37H		
7FAA C9	01030	RET			
7FAB 3EFF	01040	NONUM	LD	A:OFFH	; CODE WAS NOT A VALID HEX DIGIT
7FAD C9	01050	RET			
7FAE 210000	01060	INP4	LD	HL:0000H	ROUTINE TO ENTER 4 HEX DIGITS FROM KEYBOARD
	01070				; FIRST MUST CLEAR HL-REG
7FB1 C0A00B	01080	INPUT	CALL	SCAN	; SCAN KEYBOARD
7FB4 C0B17F	01090	JP	Z:INPUT	; LOOP IF NO KEY PRESSED	
7FB7 FE0D	01100	CP	0DH	; IS IT A CARRIAGE RETURN	
7FB9 C2B07F	01110	JP	NZ:NEXT	; NO, PROCEED	
7FBC C9	01120	RET			
7FBD C07A7F	01130	NEXT	CALL	ASCII	; CONVERT ASCII TO BINARY (HEX)
7FC0 32FF7F	01140	LD	(CHAR):A	; SAVE IT IN CHAR	
7FC3 D6FF	01150	SUB	OFFH	; WAS NON-NUMERIC KEY PRESSED?	
7FC5 CAEB7F	01160	JP	Z:ERASE	; YES, ERASE IT	
7FC8 7D	01170	LD	A:L	; AND, PROCEED	
7FC9 C824	01180	SRL	H	; SHIFT HL LEFT 4 BITS (A NIBBLE)	
7FDB C824	01190	SRL	H		
7FDD C824	01200	SRL	H		
7FDF C824	01210	SRL	H		
7FD1 C825	01220	SRL	L		
7FD3 C825	01230	SRL	L		
7FD5 C825	01240	SRL	L		
7FD7 C825	01250	SRL	L		
7FD9 C83F	01260	SRL	A	; SHIFT A RIGHT 4 BITS	
7FDB C83F	01270	SRL	A		
7FDD C83F	01280	SRL	A		
7FDF C83F	01290	SRL	A		
7FE1 B4	01300	OR	H		
7FE2 67	01310	LD	H:A		
7FE3 3AFF7F	01320	LD	A:(CHAR)		
7FE6 B5	01330	OR	L	; INSERT NEW HEX DIGIT INTO HL-REG	
7FE7 6F	01340	LD	L:A		
7FEB C3B17F	01350	INPUT	JP	CONTINUE	
7FEB 2A6840	01360	ERASE	LD	HL:(4068H)	; LOAD HL-REG WITH CURSOR LOCATION
7FEE 2B	01370	DEC	HL	; BACK IT UP ONE SPACE	
7FEF 226840	01380	LD	(4068H):HL		
7FF2 3E20	01390	LD	A:20H	; PRINT BLANK OVER LAST CHARACTER	
7FF4 D7	01400	RST	10H		
7FF5 2A6840	01410	LD	HL:(4068H)		
7FF8 2B	01420	DEC	HL	; FIRST0 BUMPED CURSOR, SO WE DECREMENT IT AGAIN	
7FF9 226840	01430	LD	(4068H):HL		
7FFC C3B17F	01440	JP	INPUT	; BRANCH BACK TO INPUT ROUTINE	
0001	01450	CHAR	DEFS 1	; TEMP STORAGE FOR CHARACTER	
7EC4	01460	END	DUMP		
00000	TOTAL	ERRORS			



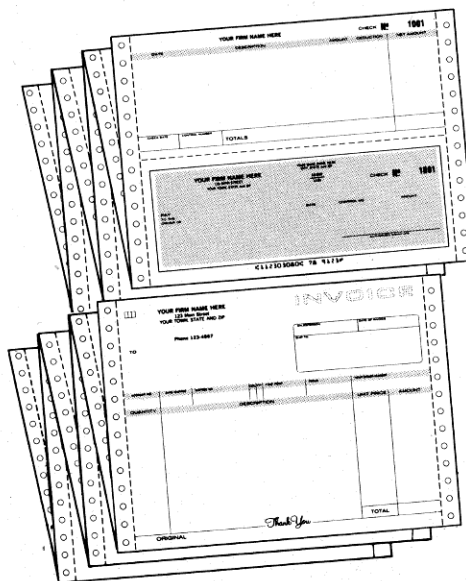
194

FREE COMPUTER FORMS KIT

EACH KIT CONTAINS:

Samples, Prices, Order Form,
4 Checks, 2 Statements, 2 Invoices,
Programming Guides.

We specialize in small quantities, low prices.
500 CHECKS ONLY \$29.95



**SEND COUPON, CIRCLE BINGO or
PHONE TOLL FREE
1 + 800-225-9540**

FAST SERVICE — It is our policy to ship within 6 working
days following our receipt of your order. **CODE 459**

Name _____

Address _____

City _____

State, Zip _____

NEW ENGLAND BUSINESS SERVICE, INC.
GROTON, MASS. 01450

DEBUG-S/S FOR YOUR TRS-80*

5020:	21 34 50	LD	HL,5034	18F7	0
5021:	10 21 30 50	LD	10,5030	JR	5020
5022:	10 21 30 50	LD	10,5030	JR	5020
5023:	03 31 50	CALL	5021	DC	00FF HL 00FF
5024:	10 05	JR	5020	DC	00FF HL 00FF
5025:	05	JR	(HL)	DC	00FF HL 5034
5026:	10 05	JR	(HL)	DC	00FF HL 5034
5027:	10 05	JR	(HL)	DC	00FF HL 5034
5028:	05	JR	(HL)	DC	00FF HL 5034
5029:	05	JR	(HL)	DC	00FF HL 5034
5030:	05	JR	(HL)	DC	00FF HL 5034
5031:	05	JR	(HL)	DC	00FF HL 5034
5032:	05	JR	(HL)	DC	00FF HL 5034
5033:	05	JR	(HL)	DC	00FF HL 5034
5034:	05	JR	(HL)	DC	00FF HL 5034
5035:	05	JR	(HL)	DC	00FF HL 5034
5036:	05	JR	(HL)	DC	00FF HL 5034
5037:	05	JR	(HL)	DC	00FF HL 5034
5038:	05	JR	(HL)	DC	00FF HL 5034
5039:	05	JR	(HL)	DC	00FF HL 5034
5040:	05	JR	(HL)	DC	00FF HL 5034

**AT LAST!!
A POWERFUL
DEBUG MONITOR
FOR THE
EXPERT & NOVICE
PROGRAMMERS**

DEBUG-S/S is a uniquely powerful monitor for: (1) analyzing, (2) creating or modifying, and (3) debugging machine-language programs on your level II, 16K system.

EFFICIENT — SIMPLE — FUN

No longer do you need to keep reaching for your reference card or searching through your program listing while debugging your program. — Most all of this information is at your fingertips with DEBUG-S/S. Warning - Debugging your program with DEBUG-S/S is so efficient and convenient that you may find yourself wishing that you had more bugs to find.

RUN IN SLOW MOTION

With DEBUG-S/S you may run your program in slow motion or single step and observe your Z-80* registers dynamically and/or observe your message printing on the screen one-character-at-a-time!

SPLIT/SCREEN DISPLAY

DEBUG-S/S uses a convenient split screen display system. The upper right section of the screen automatically displays upon entry to DEBUG-S/S from the user's program. This section shows the user's next instruction in hexadecimal and disassembled symbolic form, and also shows the user's major Z-80* registers. The left portion of the screen is for the user's display or a scratch pad area for memory dumps. The lower right section of the screen is where DEBUG-S/S commands are entered and echoed for the user's inputs.

TRANSPARENT MODE

DEBUG-S/S may be operated in a transparent mode which leaves the entire screen showing all of the user's display data upon entry to DEBUG-S/S, except for the letter D displayed on the upper right corner of the screen indicating that DEBUG-S/S has been entered. If the user now wishes to examine his Z-80* registers, he simply types D (Display).

"NO CRASH" BREAKPOINTS

DEBUG-S/S uses a single byte breakpoint which means you may put a breakpoint in the first byte of any instruction in your program and not cause your program to crash because of the breakpoint insertion. Your breakpoint will stay active until you reset it or redefine it. This allows you to run through loops in your program repeatedly without having to redefine your breakpoint each time. You may enter any number of one byte pseudo breakpoints simultaneously in your program manually with the Memory command.

POWERFUL COMMANDS

Examples of DEBUG-S/S commands are: Jump - Go - Breakpoint - Memory examine/modify - Hex Dump - ASCII Dump - Symbolic Instruction Dump - Single Step - Automatic Step start/stop - Increase/Decrease Auto Step rate - Clear Screen and save cursor position - Clear Screen and home cursor position, plus other commands.

YOU WILL RECEIVE

You will receive a cassette and instruction manual. DEBUG-S/S is assembled into lower memory on one side of the cassette and into the top of 16K memory on the other side. DEBUG-S/S uses 4K of RAM.

*TRS-80 is a trademark of the Tandy Corporation.

*Z-80 is a trademark of Zilog.

Send check or money order payable to:

CALSOFT
4421 Gilbert St. #303
Oakland, CA 94611

\$39⁹⁵

California Residents add 6.5% Sales Tax.

(PRINT)

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

ERASE	7FE8
CHAR	7FFF
NEXT	7FBD
INPUT	7FB1
MSK45	7FA2
SUB37	7FA5
OK	7FA9
NOMUM	7FAB
ASCII	7FA7
LOOP	7F70
BYTCT	7F78
TEMP	7F77
KEY	7F2F
ASC7	7F57
ASC6	7F55
ASC5	7F53
HIGH	7F59
ASC4	7F51
ASC3	7F4F
LOW	7F58
INP4	7FAE
ASC2	7F4D
ASC1	7F4B
SETBLK	7F5D
DUMP	7EC4
SCAN	0B40
CTON	0FE9
CSAVE	0F4B

also uses a routine at 10H, which is called with the RST (re-start) instruction. (A restart instruction is simply a one-byte CALL instruction, which was meant for use in interrupt response by the people who designed the Z80 microprocessor.) If you want further details of the program operation or the way in which the subroutines work, just read the comments—the code is quite straightforward.

Byte Structure on the TRS-80

If you have had some assembly language experience on 32 or 16 bit machines prior to buying your TRS-80, you may be in for a couple of surprises. Most 16 or 32 bit machines use one word for a single machine code instruction. Since the word length is only 8 bits on the Z-80, you frequently need 2, 3 or even sometimes 4 words (bytes) for an instruction, just to convey enough information about the instruction.

On most machines, words = instructions, but on an 8 bit machine, words ≠ instructions.

Most assembly languages have a special symbol that means "the contents of the location counter" or, "this address." The TRS-80 ASSEMBLER symbol for this concept is \$ (for other assembly languages I have used, it has been \$, *, and @).

Some languages frequently terminate a loop by means of a conditional branch followed by an instruction to jump to this end location minus whatever is required to come back to the start of the loop. Normally you would count instructions and write: JUMP \$ - 5, if the start of the loop was 5 instructions back (and if the mnemonic for jump was JUMP). In the TRS-80 assembler, you must count bytes, so that if the start of the loop was 5 instructions back, then it would have to be many more bytes than that back. This caused me quite a lot of consternation and nearly convinced me that I had a computer that had it "in" for me. ■

and your program will not run.

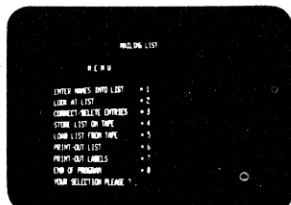
When DUMP prints R?, it goes into a loop waiting for ENTER to be pressed. It does this by calling a machine language routine (SCAN) stored in the BASIC ROM that scans the keyboard, and if a key has been pressed, returns the ASCII code for the key in the A-Register. DUMP checks to see if this code equals ODH (the code for carriage return or (ENTER)). If it does, DUMP begins; if it does not, then it loops back and calls SCAN again.

When the carriage return (ENTER key) is sensed by this process, DUMP calls CTON (a machine language program in ROM that turns on the cassette), loads the low address into the HL register, the high address into the DE register, and calls CSAVE (a machine language routine in the ROM that expects the addresses in the HL and DE registers, and which actually writes memory to cassette). Then DUMP loops back and starts all over again.

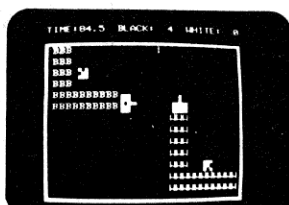
Another routine used by DUMP is ASCII, which expects an ASCII numeric code in the A-Register on call, and which returns the converted hexadecimal value in the A-register. If the ASCII code was not a numeric one (i.e., not 0-9 or A-F), then ASCII returns FFH in the A-register as an error indicator. ASCII is called by INP4. DUMP

Mention 80 Microcomputing when you order.

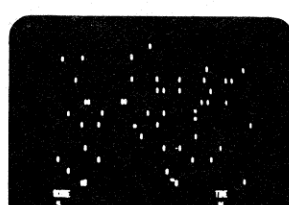
Software for the TRS-80



MAILING LIST \$ 9.95



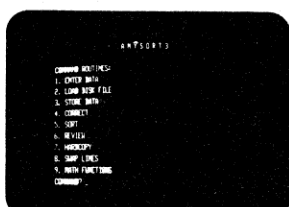
TANK \$ 6.95



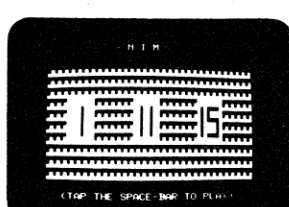
MINEFIELD \$ 6.95



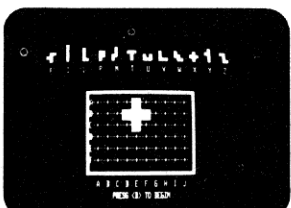
MAZE-80 \$ 9.95



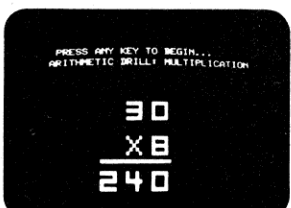
ANY SORT 3 \$29.95



NIM \$ 6.95



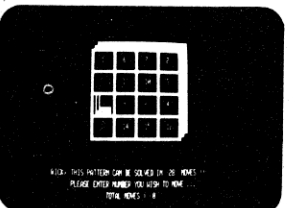
PENTOMINOES \$ 9.95



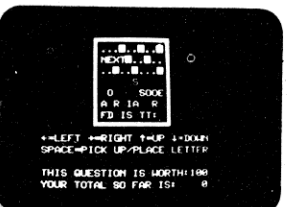
ARITHMETIC \$ 6.95



COMPUTER MINDREADER \$ 6.95



15 NUMBERS \$ 6.95



QUIZMACHINE \$ 6.95

TRS-80 TIELINE

TRS-80 TIELINE is an extended smart terminal program. Functions supported with this package are the ability to send and receive BASIC data and programs. A fully supported set of timeshare ASCII control keys are software selectable. 'ESC' and a 'BREAK' key function do not require any hardware modifications. Smart functions make it possible to jump from mode to mode with communication prior to program transmission or reception. Half and full duplex modes as well as line feed transmission or suppression, baud rate, parity, word length, stop bits are software selectable and can be changed while running. A printer can be connected for hard copy of communications as well as LLIST at baud rates that include 134.5 baud for certain serial printers. A special host or source mode allows other computers to use the TRS-80 TIELINE as a timeshare style computer. Programs can be run as well as disk files loaded, saved or transmitted by control from the distant computer. Character echo-back is supported. Host override of forbidden commands is possible. An additional feature allows testing of the TRS-80/RS232 hardware. The program is available for DOS 2.0 - 2.2 machines with 32K memory, RS232 board and modem. Additionally, the package includes a free copy of 'THE TRS-80 DATA COMMUNICATION HANDBOOK' by Stephen Gibson. The handbook is a compilation of terms and in-depth explanations of data communication from the standpoint of the user, the hardware, and the phone company. Various phone line services are detailed. Baud rates, bits and codes are explained at hobbyist level. How a Bell 103 modem works and how to connect it is covered with emphasis on originate and answer frequencies, duplex, half-duplex and RS232 conventions. The EIA standards are given with ASCII control character set information.

TIELINE \$24.95
TRS-80 DATACOMM HANDBOOK \$ 5.95

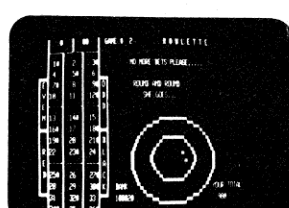
All orders include 3% postage and handling with a minimum of \$1.00. California residents include 6% Sales Tax.

VISA MASTERCHARGE

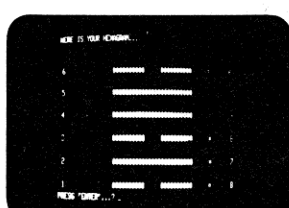
TRS-80 IS A REGISTERED TRADEMARK OF THE TANDY CORP.

PROGRAMMA
INTERNATIONAL, Inc.
3400 Wilshire Blvd.
Los Angeles, CA 90010
(213) 384-0579
384-1116
384-1117 ✓21

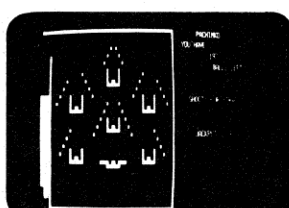
Dealer Inquiries Invited



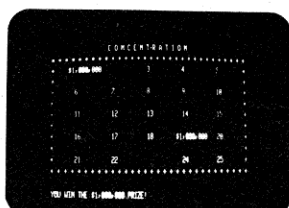
ROULETTE \$ 6.95



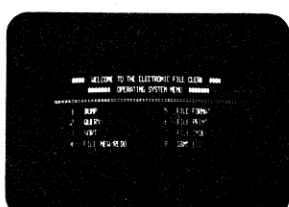
THE I CHING THING \$ 6.95



PACHINKO \$ 6.95



CONCENTRATION \$ 6.95



DBM/5 \$49.95

Dream of sound effects? Babybeep is a machine language utility to make your dreams come true.

Babybeep

Dennis Kitsz
Roxbury, VT. 05669

Babybeep sound modules are short, machine-language programs that can enhance computer games, add sonic feedback to program en-

try, signal the end of a program's activity or provide sound wherever you want it.

The idea was an offshoot of a problem proposed to me by a fellow from Texas who called in response to my earlier programs. He asked if a TRS-80-to-Tarbell conversion program could be developed. Of course it could,

and the very obvious next step was to use the cassette output port for other audio events.

The modules are very versatile. All sorts of loops, glissandi and sequences are possible.

First Option

The easiest way to add the modules to your current games is to protect memory, load a BASIC game program and then load a machine-language SYSTEM sound program of Babybeep, created with an Editor/Assembler or T-BUG. A few simple commands can then be inserted in your BASIC program lines wherever a sound effect is to occur, as in the following example:

```
10 INPUT "WHAT IS YOUR NAME";A$
20 POKE 16526,237 : POKE 16527,125
: XX = USR(0)
```

POKE 16527,125

as the first line of the game program. Use the index in Example 2 for the individual sounds.

The nine lines in Example 2 can be used as a program by

Program Listing 1: Babybeep/Machine Language Version.

```
10 FOR X = 32000 TO 32303 : READ A : POKE X,A : NEXT X : POKE 16527,125
20 DATA 14,8,6,192,205,27,126,197,16,254,193,16,247,13,121,254
30 DATA 0,32,239,201,14,16,33,32,0,205,27,126,6,160,16,254
40 DATA 43,124,181,32,244,33,0,10,43,124,181,32,251,13,121,254
50 DATA 0,32,227,201,14,10,6,48,205,27,126,197,6,255,16,254
60 DATA 193,16,245,6,80,205,27,126,197,6,96,16,254,193,16,245
70 DATA 13,121,254,0,32,224,201,6,64,205,27,126,197,6,192,16
80 DATA 254,193,16,245,6,128,205,27,126,197,6,80,16,254,193,16
90 DATA 245,6,255,205,27,126,197,6,48,16,254,193,16,245,6,176
100 DATA 205,27,126,197,6,176,16,254,193,16,245,6,255,205,27,126
110 DATA 197,6,32,16,254,193,16,245,14,16,6,16,205,27,126,197
120 DATA 6,255,16,254,193,16,245,13,121,254,0,40,10,33,0,10
130 DATA 43,124,181,32,251,24,227,201,14,8,6,0,205,27,126,197
140 DATA 4,120,246,0,32,250,193,4,120,246,0,32,239,6,255,205
150 DATA 27,126,197,16,254,193,16,247,13,121,254,0,32,220,201,6
160 DATA 128,205,27,126,197,6,128,16,254,193,16,245,201,6,192,205
170 DATA 27,126,197,6,64,16,254,193,16,245,201,14,32,33,10,0
180 DATA 205,27,126,6,255,16,254,43,124,181,32,244,33,0,1,43
190 DATA 124,181,32,251,13,121,254,0,32,227,201,58,61,64,230,253
200 DATA 198,2,211,255,214,2,211,255,201,58,32,75,73,84,83,90
210 DATA 198,2,211,255,214,2,211,255,201,58,32,75,73,84,83,90
```

Program Listing 2: Babybeep/BASIC Version.

Both of the above programs are identical versions of an eight-sound module, which can be used to add audio effects to games, information entry, etc. The machine-language version can be prepared by hand; the BASIC version should be placed at the beginning of a program. Renumber the lines as necessary to squeeze it in. Line 10 has already POKEd the most-significant byte into the USR(0) location. See Fig. 1.

```
10 POKE 16527,125 REM * MSB OF SOUND MODULES
20 INPUT "FIRST PLAYER";A$ REM * LSB OF FIRST SOUND
30 POKE 16526,233 : XX = USR(0)
40 INPUT "SECOND PLAYER";B$ REM * LSB OF SECOND SOUND
50 POKE 16526,237 : XX = USR(0)
```

Example 1.

PHASER	POKE 16526,0 : XX = USR(0)
BEEPS	POKE 16526,20 : XX = USR(0)
DOODLES	POKE 16526,52 : XX = USR(0)
FANFARE	POKE 16526,87 : XX = USR(0)
SIREN	POKE 16526,184 : XX = USR(0)
ONE BLOOP	POKE 16526,223 : XX = USR(0)
ONE BLEEP	POKE 16526,237 : XX = USR(0)
RASPBERRY	POKE 16526,251 : XX = USR(0)

*Put any unused program variable in place of XX.

Example 2.

themselves to listen to all the effects, in order.

Second Option: Single Tape Load

This is more complicated, and you should think through this process carefully. You can, at the beginning of the BASIC program, use the method shown in Example 3. Line 10 describes the addresses (in decimal) to be loaded with the machine-program bytes, and lines 50 and following list the program data (also in decimal form).

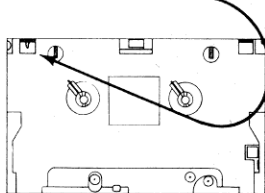
The accompanying Babybeep sound program may be appended to any BASIC program, with certain considerations. First, be sure you put it at the *beginning* of the BASIC program. Renumber lines, if necessary, to squeeze it in.

If you put it anywhere else, the possibility arises that either the BASIC program won't get to it, and a `USR(0)` command will cause unpredictable results, or it will `READ` other DATA, instead of the machine-program data.

Although this option allows you to run the whole sound-modified program in one load, it requires sure-footed programming—and accurate typing!

Hooking It Up

Hooking it up is the easy part. Load your program(s) and take out the program cassette. Put the player into record. Most cassette players have a record-protect interlock, which is nothing more than a small lever or switch. Find it here:



By pushing this lever back, you can put the machine into record.

Next, if your recorder has a monitor switch, set it. If not, plug a speaker (a pillow speaker is ideal) into the earphone or monitor jack.

You may also simply remove the TRS-80's data output plug to the cassette player, and plug it into any audio amplifier.

Now you're all set to have

sound with your programs!

Notes on Using `USR(0)`

Level II BASIC has one command, `USR(0)`, that allows a BASIC program to access a machine-language program like Babybeep. It gets there by way of an address stored in memory. Location 16526 (decimal) holds the least-significant half of the machine-program address. Location 16527 (decimal) holds the most-significant half of the machine-program address.

Unfortunately, Radio Shack did not allow Level II BASIC to use hexadecimal numbers. That means that a simple address like 7D32 (hex) cannot be entered as it stands. It must first be split into halves:

7D 32

and each half converted to its decimal equivalent:

125 50

These numbers are then `POKE`d into locations 16527 and 16526, respectively. (My article, "Babybug," Feb. 80 *Microcomputing* covers this system.)

Summary

1. Protect memory at 32000 (in response to `MEMORY SIZE?`).
2. Load the complete BASIC program with extra DATA lines.
-OR-
2A. Load the BASIC program with added `POKE` lines only.
2B. Load the separate `SYSTEM` tape.
- 2C. Press the `BREAK` key after this load.
3. Remove the program cassette.
4. Put cassette machine in record.
5. Turn switch on cassette to monitor or install speaker in ear-phone jack.
6. **RUN.** ■

```
10 FOR X = 32000 TO 32NNN
20 READ A
30 POKE X,A
40 NEXT X
50 DATA .....
60 DATA .....
.... ETC.
```

Example 3.

First Module: `RISING GLISSANDO (PHASER)`:

```
0E 08 —number of zips
06 C0 —speed
3A 3D 40 E6 FD C6 02 D3 FF D6 02 D3 FF —OUTPUT MODULE
C5 10 FE C1 10 F2 0D 79 F6 00 20 EA C9
```

Second Module: `SOUND AND SILENCE (BEEPS)`:

```
0E 10 —number of boops
21 20 00 —boop length
3A 3D 40 E6 FD C6 02 D3 FF D6 02 D3 FF —OUTPUT MODULE
06 A0 —frequency
10 FE 2B 7C B5 20 EF
21 00 0A —silence length
2B 7C B5 20 FB 0D 79 FE 00 20 DE C9
```

Third Module: `ALTERNATING PTICHES (DOODLES)`:

```
0E 0A —number of alterations
06 30 —first length
3A 3D 40 E6 FD C6 02 D3 FF D6 02 D3 FF —OUTPUT MODULE
C5 06 FF —first frequency
10 FE C1 10 F0 06 50 —second length
3A 3D 40 E6 FD C6 02 D3 FF D6 02 D3 FF —OUTPUT MODULE
C5 06 60 —second frequency
10 FE C1 10 F0 0D 79 FE 00 20 D6 C9
```

Fourth Module: `THE OUTPUT SUBROUTINE`

This subroutine may be used instead of repeating the output module with every sound. It saves 4 bytes over each repeat.

```
3A 3D 40 E6 FD C6 02 D3 FF D6 02 D3 FF C9
```

Fig. 1. Use these Babybeep program modules if you want to construct your own sets of sounds or if you want to add sound in special ways.

ADVANCED BUSINESS SOFTWARE FOR THE TRS-80*

- * FORECASTING
- * CAPITAL INVESTMENT
- * RISK ANALYSIS
- * PRODUCTIVITY ANALYSIS
- * FINANCIAL SIMULATION
- * U.S. MACRO MODEL

These programs are essential for business planning in today's volatile economic climate. Two examples which run on TRS-80 LEVEL II machines are: Our **RISK ANALYSIS** model which brings the uncertainties into focus and gives you the information you need in order to make informed business choices. The model can be used to determine the **range of possible R.O.I.'s** for an investment, the **range of costs** for a construction project or the distribution of labor hours needed to complete an engineering design. **Several built-in features make this one of the easiest risk programs to use.** The only inputs required are the most likely, the 10% and 90% points for the variables of interest. From these inputs the program **automatically** calculates the beta curve parameters. Variables may be added, multiplied subtracted or divided in the user model area. This adds great flexibility to the program and allows great freedom in selecting the proper model. This Monte Carlo risk model comes with detailed User Instructions and can be run on 32K LEVEL II TRS-80's (printer output optional). Cost of the Risk Analysis model is \$49.

Another program useful for business planning is our **CAPITAL BUDGETING** program which analyzes the depreciation and tax impacts for an investment project. The program allows investment and revenue streams to vary over the investment lifetime and includes 5 different depreciation methods. The before and after tax cashflow for each year is shown along with the summary data. The summary statistics for the **CAPITAL 1** program includes the R.O.I., the net present value, the payback period, the discount rate (cost of capital) and the profitability index. The cost of the Capital Budgeting Program is \$27.

Call or write for complete information.
APPLIED ECONOMIC ANALYSIS
4005 Locust Ave., Long Beach, Ca 90807
(213) 424-3652 ✓47

*Trademark of Tandy Corp.

T-BUG is the Radio Shack Monitor, read about a more expensive one from Small Systems Software.

RSM-2 Monitor

Bruce W. Churchill
6282 Lake Leven Dr.
San Diego, CA 92119

People are talking about Radio Shack's T-BUG monitor and reviewing it widely in personal computing literature, but one TRS-80 monitor available today has so many more capabilities than T-BUG that it deserves special recognition. The Small System Software RSM-2/2D, designed by Gary Thurmond and Tom Nussmeir can far exceed the usual monitor functions of inspect and change, cassette read/write, jump and execute, breakpoints, and the like.

The increase from \$14.95 to \$26.95, gains over three times the capability of Radio Shack's T-BUG, making the RSM-2, not only superior, but cost effective.

What is RSM-2?

RSM-2 has been designed to

operate with the Level II, 16K version of the TRS-80. You can do I/O operations directly to and from mini-disk sectors, if your system is so equipped. The RSM-2D version of this monitor is the same but is distributed on mini-diskette media.

RSM-2 loads into high memory—6C00 hex, or 27648 decimal—and occupies 4863 bytes of RAM. The mini-diskette version loads into high RAM of the 16K, 32K or 48K disk configurations and can be used with a hard-copy device.

RSM-2 supports the Small System Hardware TRS232 serial data interface and any printer interfaced through the Centronics parallel port on Radio Shack's Expansion Interface.

The addition of the RSM-2 monitor and a Teletype Model 43 printer have made the world of machine language programming a wholly different experience. A handy feature that I

quickly discovered is the → key to initiate simultaneous CRT/printer output—in fact, depressing the → key prior to entering a monitor command will cause that command to be printed as well. A nice bonus for documentation!

Not counting the printer command, there are 31 commands available in the RSM-2 monitor. They fall into the general groupings of control, tape, disk and memory commands. I also discovered user access to four routines within RSM-2: the CRT processing routine; the keyboard routine; the routine that checks for BREAK key depression and the printer driver. This accessibility is provided by five jumps at addresses 6C00, 6C01, 6C02, 6C03 and 6C04. The 6C00 jump is to the monitor start. These subprograms then become useful as adjuncts to your own programs as long as RSM-2 is co-resident within RAM.

Another unique feature of RSM-2 is the ability to halt cassette I/O operations with the BREAK key. This is an improvement over the Level II BASIC scheme of having to depress the reset button to restart cassette I/O. This is made possible by self-contained read/write routines within RSM-2. There are no calls to the BASIC interpreter in ROM for these functions. For additional information on the location and operation of specific routines within RSM-2, registered owners may send for a well-documented assembly source listing of the 16K version

of RSM-2 (less the symbolic dump, or disassembler portion). This document is well worth the additional \$7.50 investment if you are a serious machine language student.

Control Commands

The control commands consist of the following:

- GOTO: Transfers control to a specified address and starts execution there.
- INITIALIZE: Clears screen and initializes scratchpad memory.
- PORT INPUT: Reads specified port and displays data on CRT.
- PORT OUTPUT: Outputs a specified byte to a designated port.
- USER: Allows the linkage of user-defined programs to RSM-2.
- KEYBOARD ECHO: Direct keyboard-to-CRT data transfer.
- BINARY ARITHMETIC: Computes the sum and two-way difference for base 10 and 16 numbers.
- TRS232 PARAMETERS: Allows modification of serial printer parameters.
- BREAKPOINT: Halts program and displays CPU register contents.

Most of these commands are self-explanatory and fairly typical of those in other monitors, however some are deserving of a closer look.

For example, the experienced TRS-80 user will notice that the PORT INPUT and PORT OUTPUT commands are virtually identical to the Level II BASIC commands INP and OUT and to the Z-80 machine instructions IN A,PORT and OUT PORT,A. The benefit of having them in RSM-2 is that they are directly accessible during monitor operation, particularly during the programming and debugging of interface applications.

The USER command gives the programmer a minimum of 128 bytes (from 7F80 to 7FFF) in which to locate self-designed

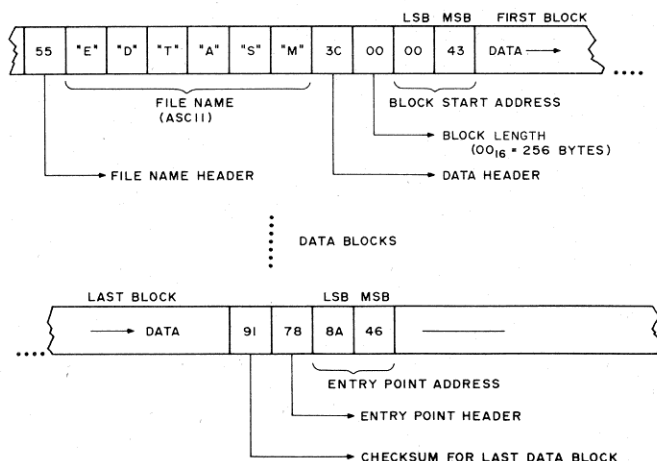


Fig. 1. TRS-80 Level II SYSTEM tape format

ADDRESS	OLD CODE(HEX)	NEW CODE(HEX)
7331	21 00 FF	21 C0 3F
7334	E5	E5
7335	36 07	00 00
.	.	.
.	.	.
.	.	.
734F	C3 D3 6D	00 00 00

Table 1 SSS patch for READ SYSTEM TAPE function in RSM-2

patches that might complement RSM-2 functions. Of course a jump to RAM lower than 6C00 would allow even more space if memory conservation were not a factor. Values for the BC, DE and HL registers may be specified for passing to the user program.

The BINARY ARITHMETIC command allows the programmer to input two numbers, A and B, and compute $A + B$, $A - B$ and $B - A$ in both hex and decimal notation. This function is handy for determining required memory offsets as we shall see later in this article.

The BREAKPOINT command operates much the same as in other monitors. The register display format is:

```
AF BC DE HL IX IY STAK
0360 0000 6000 7000 4173 6F7E
0054 1ACE 103D 9231 5033 6DCF
```

The first row represents primary registers, the IX register and the Stack Pointer register; the second row represents alternate register pairs AF', BC', DE', HL', the IY register and the address at the top of the stack.

The tape and disk commands consist of the following:

WRITE TAPE: Writes cassette in RSM format (object code).
PUNCH TAPE: Writes cassette in Level II SYSTEM format.
READ TAPE: Reads RSM format tapes into memory.
READ SYSTEM TAPE: Equivalent to the Level II SYSTEM function.
READ DATA TAPE: Reads any tape data into specified RAM address.
LOAD AND GO: Reads RSM format tape and transfers control to the start address.
CHECK TAPE: Works similar to the CLOAD? function but for RSM format tapes.
SAVE TO DISK: Writes directly from RAM to disk sector.

Again many of these functions are self-explanatory, but I am going to digress from our command review and talk about some interesting applications.

The READ SYSTEM TAPE command, for example, can be used to read a standard Level II format tape as was mentioned in the command summary; however, it has an added feature. As the machine language tape loads, the file name appears on the lower portion of the CRT and when the load is complete, the entry point address (the address where program execution begins) is also displayed. This is a particularly useful feature if you are not sure of the file name of a machine language program tape or where to specify the execution, if you're transferring control to a resident program from BASIC.

There is one minor drawback to the READ SYSTEM TAPE command, however. It is very sensitive to the noise generated at the I/O crossover points of data on the tape, a characteristic that is all-too-present on some mass-produced commercial program tapes.

There are two solutions to this problem: one is to enter the patch in Table 1, which was kindly provided by Gary Thurmond of SSS; the other is to create a backup copy of the SYSTEM tape on a good-quality audio or digital cassette. The latter fix can be done with the RSM-2 by using a procedure that I will explain shortly. This procedure alone is worth the entire RSM-2 cost. It is made possible by the existence of the READ DATA TAPE command, a command which is not documented in the manual accompanying RSM-2.

The READ DATA TAPE command is the unsung hero of the RSM-2 monitor. Unsung because it is not described in the documentation, and a hero because it allows reliable machine language program tape copying. It functions very simply by ignoring any input format processing and reading any cassette as raw data. All bytes past the synchronization byte on a SYSTEM tape (or any other tape) are read into memory beginning at a user-specified address. There is no checksum processing, nor is there a routine to shut off the cassette motor, so certain precautions

This Weekend: STIK IT.... ..to your

That's right! Esmark's VIDJET-STIK light pen has the TRS-80 CONNECTION for LEVEL I & II. Your 4K to 48K TRS-80 System will come alive under your VIDJET-STIK within minutes of its arrival. That's because there are no wires to solder or traces to cut. You're up and running as fast as you can plug the interface into your system's cassette EAR-jack. CLOAD our custom LIGHT-WAVE demonstration software and RUN. And because the interface has a plug for your recorder, you won't have to unplug it again when loading your other software tapes. The interface allows them to snap right thru whenever you're not using the pen. It's exclusive "switched tip" design means the pen's electrically isolated from your system when it's not in use. Just point & press! It's that simple... Plug, CLOAD and RUN. And have we got the software for you to RUN with! Our demonstration tape includes a calibration program (used to adjust the CRT's brightness and contrast) plus STIK-TAC-TOE, AWARI and TOWERS. Two challenging games and a puzzle that will keep grownups and children Stiking it to your TRS-80 for hours. And there are instructions provided so you can begin writing your own light pen programs (lightware) for fun or profit (Level II). Or, just sit back and enjoy our LIGHT-WAVE tapes each month. Esmark's unmatched commitment to lightware can bring you up to five new games, puzzles, drills & educational quizzes or simulations each month. Our current LIGHT-WAVE releases are:

LIGHT-PAK 2 — LIGHTPEG (4 peg-jump puzzles)
 ENDRUN (Othello with a twist)
 (LEVEL II) LIFE9 (Conway's LIFE with mutations)
 Price: \$19.95 (including postage & handling)
LIGHT-PAK 3 — LITEGAMMON (Backgammon you'll Stik with)
 (LEVEL II) STIKWUMPUS (Caves with a little 'lite')
 MAZEMASTER (Maze after maze to poke thru)

Order yours now and we'll include a free copy of FLASHBACK, Esmark's newsletter dedicated to the latest news in lightware applications. And, don't forget to tell your friends. The VIDJET-STIK can also be ordered for use on most other micro systems using the following processor chips:

8080 Z80 6800 6502

All that's required is a standard cassette jack leading to Ground and a readable single bit input port. Driver software is provided along with instructions for writing lightware applications. And tell your local Dealer that Esmark's got a Dealer package he won't want to miss out on. Delivery is 3 to 6 weeks from receipt of your order. C.O.D.'s are \$3.00 extra but will be shipped within two weeks. All prices are F.O.B. Mishawaka, Indiana. Indiana residents add 4% state sales tax.

ALSO COMING FROM ESMARK:

- [] TRS-80 Printer Interface (Cassette AUX-jack interface for all RS232 printers. Includes LLIST & LPRINT software)
- [] TRS-80 RS232 Communications Interface (Makes your TRS-80 a full I/O terminal to timesharing systems the world over. Gives you intelligent or dumb terminal capabilities at 110 or 300 BAUD. Also includes Printer Interface above with 20 mA current loop & TTL level I/O options.)

— TRS-80 is a trademark of the Tandy Corporation —



ESMARK* INCORPORATED

507 1/2 E. MCKINLEY HWY. MISHAWAKA, IN 46544
 (219) 255-3035

✓ 40

\$62.95

PLUS \$1.50
 POSTAGE &
 HANDLING

*ELECTRONIC SYSTEMS MARKETING

TRS-80

VIDJET • STIK™
 ESMARK INC. MISHAWAKA, IN 46544

TRS-80® CP/M® & CBASIC® BUSINESS SOFTWARE

All MOD II CP/M's are **not** created equal . . .
Find out why ours is the **Better Business Buy!**

Model I CP/M (rel. 1.5) \$150.00
Model II CP/M (rel. 2.0) 250.00
CBASIC 95.00

APH (Automated Patient History) 175.00
RESIDENTIAL PROPERTY ANALYSIS
system 300.00

The Genuine Article:

Osborne & Assoc. CBASIC source programs—
O&A **Payroll** w/Cost Accounting. . . . \$250.00
O&A **Accts. Rec./Accts. Payable** . . . 250.00
O&A **General Ledger** w/Cash Journal. 250.00
O&A CBASIC books for above (each) . . . 20.00

Send 30¢ SASE for CP/M Users Group software
list & free "CP/M Primer".

- * TRS-80 is a registered trademark of Radio Shack, a Tandy company
- * CP/M is a registered trademark of Digital Research
- * CBASIC is a registered trademark of Software Systems



(714) 848-1922

8041 NEWMAN AVENUE • SUITE 208 • HUNTINGTON BEACH, CALIFORNIA 92647

QWORDFORMATTERRBGCYPQGZIVJBPCB
SHNOBTXADOFREEIDEASEEDSRPVYXXON
VLTWGYROSGREDPVJKLMRHECTVXHNAFH
BJELFEQAZGZPCRYPTOUPZAXZQJEJTS
ZDQINKFSNAGTHLGJSEYWTVPFJVZVC
BVLFGULMNSNEKOTTSCYMBGWBQOFMPO
UOVZKBFIOEPUYASXEMOLERZJXACHYRU
PKBMYUCWOCGLDMRXSEWMCZTIONGULYK
ZMHOUXPBLKACAPJJUKBFLIPCNEFQAFE
JWTAJCJGWHETMNHAAQZQJLOWERCASETH
HRSSKVCDCGBOAPTGTHTXTPLLEILRETQ
EYINDLXXCBVCVXDZHOPRYVYPRVADNTOL
FREE IDEA SEEDS!™

Have you ordered yours? If not, you better reconsider. More than 5000 happy subscribers think you don't know what you are missing. These are FREE programs for your TRS-80 and all you have to do to get them is send us a legal size SASE. That is all there is to it. Simple? You bet! Every month there's a new program and you really don't want to miss any of them! When you stop and think about it there are only three ways to build your software library. One way is to write the program yourself. Another way is to purchase programs. The best way is to have the programs given to you and that is just what we are doing! All FREE IDEA SEEDS are our own original programs and we want you to have them to use, rewrite, and expand.

Send your legal size SASE to:

CECDAT, Inc. ✓62 PO Box 8963 Moscow, ID 83843

D 4300

```
4300: 55 45 44 54 41 53 40 3C 00 00 43 01 EF 43 00 00
4310: 00 4B 49 07 60 44 00 3D 20 44 4F 06 AF 45 42 00
4320: 00 50 52 21 01 FC CD 49 43 06 0B 10 FE 21 02 FC
4330: CD 49 43 06 0B 10 FE 21 00 FC CD 49 43 06 5C 10
4340: FE C9 E5 21 00 FB 18 04 E5 21 04 FF CD 49 43 E1
4350: C9 21 00 FF 3A 28 40 A4 B5 D3 FF 32 28 40 C9 3A
4360: 3F 3C EE 0A 32 3F 3C C9 C5 E5 06 08 CD 69 43 10
4370: FB E1 C1 C9 C5 F5 D8 FF 17 30 FB 06 41 10 FE CD
4380: 46 43 06 76 10 FE D8 FF 47 F1 CB 10 17 F5 CD 46
4390: 43 F1 C1 C9 E5 C5 D5 F5 0E 08 57 CD 18 43 7A 07
43A0: 57 30 0B CD 18 43 00 20 F2 F1 D1 C1 E1 C9 06 87
43B0: 10 FE 18 F2 CD 3D 43 06 FF AF CD 89 43 10 FB 3E
43C0: A5 18 D1 E5 CD 3D 43 AF CD 69 43 FE A5 20 F9 E1
43D0: 3E 2A 32 3E 3C 32 3F 3C C9 E5 D0 E5 D0 E1 D5
43E0: 21 E9 43 E5 4F 1A A0 B8 C2 1E 40 FE 02 D0 6E 01
43F0: D0 66 02 E9 D1 D0 E1 E1 C1 C9 21 21 40 01 01 38
4400: 16 00 0A 5F AE 73 A3 20 08 14 2C 96 3C 00 00 44
4410: CB 01 F2 F7 43 C9 5F 7A 07 07 07 57 0E 01 79 A3
```

COMMAND?

Program Listing 1. HEX DUMP Readout of RAM after execution of READ DATA TAPE from address 4300.

have to be taken before using this command.

The format is R XXXX YYYY, where XXXX is the number of bytes to be read and YYYY is the address where data is to begin loading in RAM. An obvious question might be, what value shall I use for XXXX? The answer is to guess, but make sure that your guess is at least as long as the target program. A perfectly safe value is 28FF hex, the maximum length of free RAM between the recommended start address of 4300 and 6C00, the start address of RSM-2.

One other use of the READ DATA TAPE command is to investigate various tape formats, including the Level II BASIC format, Editor/Assembler source file format, and of course the Level II SYSTEM tape format.

Level II SYSTEM Tape Format

Fig. 1 illustrates the format used by the Level II SYSTEM routine in ROM to load machine language (object code) programs. Each SYSTEM tape uses a certain number of bytes to put the program into its proper location in RAM and load the pointer to the entry point address. This pointer is a two-byte address at 40DF, or 16607 decimal. These bytes are a form of tape "overhead" and are not a part of the data being loaded. I will refer to these bytes as header bytes.

The first seven bytes on a

SYSTEM tape beyond the synch byte are the file name header (55 hex) and the 6 ASCII characters of the file name. Each data block that follows has five bytes of header information: 3C to indicate a data block follows, the block length (00 hex = 256 byte block), two bytes for the block start address and at the end of each data block, a checksum byte. Listing 1 is a typical display from the READ DATA TAPE command showing the file name bytes, the first data block and the beginning of the second data block. Note that the block start address is displayed in Zilog integer format (LSB, MSB).

The remaining header bytes required for SYSTEM tape loading are the entry point header code (78 hex) and the two bytes to represent the entry point address. These two bytes are stored at 40DF and 40E0 as part of the load operation. The last line of the display in Listing 3 shows the final data block checksum (91) followed by the three entry point header bytes.

When a tape is loading under the SYSTEM command, each flashing asterisk indicates every other data block. This gives us a simple method of estimating the length of an unknown program. Simply count the asterisk flashes, double that number and then multiply by the block length (assume block length = 256 bytes, although shorter

F 4300 6000 3C

```
4307: 3C 00
4361: 3C EE
4366: 3C C9
43D4: 3C 32
43D7: 3C C9
440C: 3C 00
444C: 3C 38
```

COMMAND?

```
5561: 3C 00
560F: 3C 07
5666: 3C 00
56D1: 3C 28
576B: 3C 00
5870: 3C 00
5975: 3C 00
5A3F: 3C 47
5A7A: 3C 00
5B7F: 3C 00
5C84: 3C 00
5D31: 3C FE
5D58: 3C 18
5E4F: 3C 83
COMMAND?
```

*Program Listing 2. FIND 1
BYTE: Searching for the
last data block (3C)*

blocks are sometimes used).

System Tape Duplication

Now we have the information necessary to perform a very useful function with the RSM-2 monitor—the duplication of machine language program tapes. To do this we will need the READ SYSTEM TAPE, READ DATA TAPE, HEX DUMP, FIND 1 BYTE, HUNT 2 BYTES, BINARY ARITHMETIC and PUNCH commands from RSM-2. From the target program, tape we will need the program start address, ending address and entry point address. The last of these is usually, but not always coincidental with the start address. We will use an example where this is not the case—the Radio Shack Editor/Assembler program.

First, load the target program using the READ SYSTEM TAPE command. This calibrates the recorder volume (remember that the READ DATA TAPE command does not do a checksum) and also reads the counter when the load is complete. The counter value can be used in the next step to estimate when to shut off the tape recorder.

Next, reload the tape using

the READ DATA TAPE command. The result should appear as in Listing 1 when the HEX DUMP command is invoked at address 4300. The READ DATA TAPE command is R 28FF 4300.

Note in Listing 1 the file name header, 55 EDTASM, followed by the first data block header as described above. The first parameter of interest is the program start address, 4300, which coincides with the first data block start address.

The next step is to locate the 3C header byte corresponding to the last data block. Use the FIND 1 BYTE memory command, (Listing 2) starting the search at 4300 and ending in this case at 6000. By estimating program length we can add a few bytes for comfort and come up with the ending address for the 3C search.

Now, a little guesswork is in order. Since the block length was 00 in this example, I chose the last occurrence of a 3C byte followed by a 00 byte. In this load module my choice was at address 5C84; doing another HEX DUMP from 5C84 as shown in Listing 3 confirmed this as the final data block. Note the entry point information.

To find the ending address of the executable object code, add the block length - 1 (FF) to the last data block start address (5C00) to get 5CFF. The BINARY ARITHMETIC command comes into play here as shown in Listing 3. The entry point address, 468A, can be obtained by inspection.

The last two steps involve reloading the EDTASM program to put the executable object code (as opposed to the object load module, that includes all the header bytes for the loader routine) back into its proper location in RAM. Then use the PUNCH command with the parameters 4300 5CFF 468A to create a new EDTASM tape. This procedure can be used to copy almost any Level II SYSTEM tape.

Memory Commands

Having bled the monitor dry with I/O commands, let's take a look at the memory group, some of which I already discussed.



GOLD REWARD!

Break our test message!
To earn 3 ounces of fine gold,
send stamped, self-addressed
envelope to CRYPTEXT to enter.

FEATURES:

KEY LENGTH=80 bits (more than DES!)
DATA RATE: Exceeds 15,000 chars./sec.
Pocket-size encryption device

APPLICATIONS:

Secure data transmission
High security file storage
Software protection



CRYPTEXT
CORPORATION

P. O. Box 425
Northgate Sta.
Seattle, WA 98125

(206) 364-8585

TRS-80TM

SOFTWARE!

Yes! Quality Software for the TRS-80 is now written & available. BCC is pleased to be able to present some very fine software now with even more available in the very near future. Also we develop custom designed software for your every need. Write us for a FREE price quote.

†TRS-80 is a trade mark of the Radio Shack Div. of Tandy Corp.

For Software Think BCC

✎ **Mail Base 80** — MOD I (Requires 48K & 4 drives) \$69.95
— MOD II (Requires 48K & 4 drives) \$129.95

A RANDOM ACCESS program which keeps track of an unlimited number of entries. Plus it allows direct access of information in any order. Today, list all people who have outstanding bills & tomorrow produce a list in zip-code order. EXCELLENT!!!

✎ **Oil Delivery** — MOD II (REQUIRES 48K & 4 drives) write for price quote.

A system for the '80s. This system handles everything for the heating industry.

✎ **Vendor** — MOD I (Requires 48K & 2 drives) \$39.95

This program keeps track of an unlimited number (650 per disk) of vendors. Allows direct access of coded information by vendor number, & also permits access by various other fields.

For Supplies Think BCC

✎ **Disks & Tapes** — 5 1/4 Inch diskettes 3M Brand \$49.95 (10 in plas. case)
— 8 inch diskettes 3M Brand \$64.95 (Box of 10) — 5 1/4" Verbatim \$39.95 (Box of 10)
— Cassettes Very High Quality \$16/doz C20's. — ADD 'n STAC stackable cassette holders. Each holds 8 cassettes. \$3.49ea

✎ **Printers** — The fabulous BASE 2 PRINTER 96 char ASCII with Tractor Feed & 2K Buffer. This printer just can't be beat!!! \$649.00 (2 for \$1200.00)
RECONDITIONED CENTRONICS 102A (330 chars/sec!!!) \$1500.00

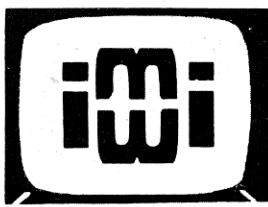
☐ Master Charge
☐ Visa

Exp. Date _____ Card No. _____
 Signature _____

ORDER NOW! All programs come on quality cassettes. Programs are available on diskette for an additional charge of \$7.00 per order. NYS residents add 7%. Check boxes of items being ordered:

of items ordered _____ Total amount enclosed _____ (All items must be prepaid)

Bourrut Consulting Corporation ✓57
21 Friendly Ad. Smithtown, N.Y. 11787



INTERACTIVE
MICROWARE, INC.
P.O. BOX 771
STATE COLLEGE, PA. 16801

✓ 202



MEANS IMAGINATION

TRS-80 LEVEL II/16K \$25.00

BASEX COMPILER AND LOADER

BY PAUL K. WARME

A powerful, easy-to-learn language that runs up to 20 times faster than BASIC. This 8K interactive compiler works much like BASIC and makes very compact programs. Features include arrays, strings, 16 bit math, block move and search, subroutines, fast graphics and tape I/O, 97-page manual, \$8 extra.

MIRRORAYS

16K/LII \$7.95

Flash rays of light into a black box in order to locate hidden mirrors, which light up and reflect the rays when hit.

LUNAR LANDER SIMULATOR

16K/LII \$7.95

This program provides REAL-TIME simulation and control of the Lunar Module through continuous keyboard interaction.

COMPACT GRAPHICS INTERPRETER

4K/LII \$7.95

Elaborate graphic designs can be created and constructed by this interpreter with a simple set of numbers.

BATTLEGRID

4K/LII \$7.95

A REAL-TIME game of speed and strategy, enabling two players to attack each other's forces.

Add \$.75 postage per order. FREE brochure with full description of each program.

ASCII DUMP: Displays memory as ASCII characters where appropriate (48 bytes per line). Periods are displayed for non-ASCII bytes.

FORMATTED ASCII DUMP: Displays memory as ASCII characters where appropriate (16 bytes per line). Indicates printable and non-printable characters as well as those with bit 7 set.

HEX DUMP: Standard hexadecimal memory dump (16 bytes/line).

EDIT MEMORY: Standard byte-for-byte modification feature.

FIND 1 BYTE: Searches for a specified byte between two addresses in any memory segment. Output is designed to find I/O instruction references.

HUNT 2 BYTES: Same as above except that two bytes are searched with Zilog integer interpretation. Designed for locating memory references.

MOVE MEMORY: Move a block of memory with overlap allowed.

CHECKSUM: Compute and display a checksum for any block of memory.

SYMBOLIC DUMP: A disassembler program using Zilog mnemonics.

TEST MEMORY: Checks each RAM address with 256 random number write/read cycles.

VERIFY MEMORY: Compares two blocks of memory and outputs differences.

EXCHANGE MEMORY: Exchanges two blocks of RAM.

ZERO MEMORY: Writes a specified value into any block of RAM.

sembler compatible source file (ASCII text) from the disassembly process.

The MOVE MEMORY command is not a relocation feature unless the program being moved uses only relative memory references, that is, unless it is a "relocatable" program. The MOVE MEMORY command does not offset any absolute memory addresses.

The MEMORY TEST command writes 256 random numbers into each memory location of a selected block of RAM. It takes about nine seconds to complete the test of each RAM location. The output is memory location, expected value and actual value for each defective memory address.

You will not be able to test the part of RAM occupied by RSM-2 unless the memory test function is removed and made an independent, relocatable program. This is facilitated by using the listing referred to earlier.

In summary, the RSM-2/2D monitor is a versatile, easy-to-use and reliable programming tool that belongs in the software collection of any serious TRS-80 user. It may not be the ultimate monitor, if such an animal really exists, but it offers exceptional value for the price. ■

The SYMBOLIC DUMP (Disassembler) lacks the capability to display ASCII characters, with the mnemonic listing. Having to refer to a separate ASCII dump for analysis of machine language programs is somewhat inconvenient. Another useful feature found lacking was the ability to create an Editor/As-

D 5C84

```
5C84: 3C 00 00 5C 5C 00 00 B6 C0 3A 7E 46 2B 77 EB 21
5C94: AF 41 04 05 20 30 06 05 CD 9A 4B 10 FB 23 7E B7
5CA4: 28 01 2B 06 09 C5 3A B4 41 4F 23 0D FC 9A 4B F4
5CB4: 4E 5C 10 F6 01 01 00 2A 11 41 F1 F5 D4 4F 4C F1
5CC4: EB 70 DC 37 47 C9 CD 4E 5C 2B CD 4E 5C 23 06 01
5CD4: 18 C6 05 7E 0F 0F 0F CD 58 5C 7E E6 0F C6 30
5CE4: FE 3A 38 02 C6 07 C3 39 47 01 B0 41 3A B4 41 F5
5CF4: 0A B7 20 01 03 F1 3D F8 F5 2A 1F 41 23 EB 2A AE
5D04: 41 22 1F 41 3A BE 41 B7 28 08 CD C2 4B 28 1A CD
5D14: C3 5C EB 21 23 41 7B 82 77 AF 23 77 2F 32 BE 41
5D24: 23 73 23 72 23 22 21 41 EB 11 24 41 1A 3C FE 81
5D34: 28 DD 12 23 22 AE 41 2A 21 41 0A 77 23 22 21 41
5D44: 03 EB 2B 86 77 18 AE E5 C5 3A 24 41 C6 04 47 21
5D54: 23 41 4E 3E 3C 18 01 7E 23 CD 89 43 10 F9 79 CD
5D64: 89 43 AF 32 BE 41 C1 E1 C9 2B 2B 2B 3A 76 46 C3
5D74: 03 5C 00 00 00 00 00 00 00 00 00 00 00 FF FF 21
5D84: 42 5D 22 AB 91 78 8A 46 00 00 00 00 00 00 00 00
```

COMMAND?

B FC00 FF

```
A      B      A+B    A-B    B-A
FC00  00FF  FCFF    FB01  04FF
64512 00255 64767 64257 01279
COMMAND?
```

Program Listing 3. HEX DUMP Readout of the last data block in RAM: The BINARY ARITHMETIC display.

S&M SYSTEMS, INC. ✓ 154

Computer Services • Hardware • Software • Consulting

Professional Business Software to operate on TRS-80* computer

• ISAM Accounting Package: **

- Accounts Payable, Accounts Receivable, General Ledger with Cash Journal, Invoicing and Payroll

Integrated Accounting System \$425.00

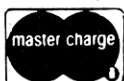
Separate Modules \$ 99.00

• ISAM Inventory Control \$125.00

- Above Systems require 2 - 3 drive Systems.
- Integrated System requires 3 - 4 drive Systems.
- Systems operate under NEWDOS by Apparat (not included)

• Machine Language Disk Sort \$ 49.95

- Multiple Keys - Ascending, Descending
- Callable under Basic



TO ORDER CALL:

(617) 685-0151

BANKAMERICARD
VISA

* Trademark of Tandy Corporation

** Accounting Package not available in the State of California.

16K DYNAMIC RAMS FOR MEMORY EXPANSION

8/\$87.20 !!

Expand memory in TRS-80* -I and -II, Exidy, Apple, new PET, Heath H89, and other machines with our low power, high speed (250 ns/4 MHz) 16K dynamic RAMs. Add \$3 for two dip shunts plus instructions for TRS-80* expansion.

*TRS-80 is a trademark of the Tandy Corporation.

Thinking about easier expansion? Higher speed? More power? Then think S-100. We stock an innovative and extensive line of S-100 bus products, from computer enclosures to color graphics boards. Send today for our free catalogue (foreign requests: add \$1 to help cover postage and handling costs).

GODBOUT

GODBOUT ELECTRONICS
Bldg. 725, Oakland Airport, CA 94614

TERMS: Cal res add tax. Allow 5% for shipping, excess refunded. VISA®/Mastercharge® call our 24 hour order desk at (415) 562-0636. COD OK with street address for UPS. Prices subject to change without notice.

✓ 75

STOCK CONTINUOUS CHECKS & STATEMENTS

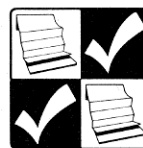
You can take advantage of the most complete line of stock, off the shelf continuous checks available, with more formats added monthly. We have an economical check that will meet your needs.

*Low Minimum Order *Fast Delivery
We have forms for most systems-including the TRS-80*
The Best Choice for the Small Computer User.

FREIGHT
INCLUDED

SEND FOR YOUR FREE SAMPLES TODAY!

- * Personal Checks
- * Payables Checks
- * Payroll Checks
- * Combination Checks
- * Statements
- * Invoices
- * Small Minimum Orders
- * Fast Delivery



Checks To-Go

✓ 46

* Registered Trademark of Tandy Corp.

P.O. Box 148, Spring Valley, California 92077 (714) 460-4975

SPECIAL DELIVERY®

TRS 80® + Electric Pencil®

By adding SPECIAL DELIVERY to Electric Pencil
you can realize the full potential of your TRS-80!
A 100% machine language word processor!!

MAILFORM — Create MAILFILE: A complete Name and address list entry/editor program. Instant search on any field, complete cursor control, optional beeper to let you know something is wrong, active file always displayed, search can include numeric only as well as don't care characters, just FILL IN THE FORM!!

MAILRITE — Print letters written with the Electric Pencil inserting information from a MAILFILE into the letter for personalizing and addressing. True typist quality using your printer. Features: Indents, underscore, end of page stop, unlimited insertion from address list, address envelopes and MORE!

SORT — MAILFORM will sort an entire address list in seconds using any field as the key.

LABEL — MAILRITE prints mailing labels from MAILFILE.

CONVERT — Transform your Radio Shack Mailing list into a MAILFILE!

SPECIAL DELIVERY (Disk)
Electric Pencil (Disk)

125.00
150.00

Phone Orders (214) 357-8357

Or write for brochure of our complete line of fine software!



SOFTWARE, ETC...

1839 CHAMBERLAIN DRIVE
CARROLTON, TX 75007



✓ 42

Introducing

COBOL + FORTRAN + 64K RAM

FOR YOUR TRS-80*

★ Release your software chains with the **NEW FREEDOM OPTION**, a plugable change that restructures the TRS-80 on command to perform like a large Z80 system. All the TRS-80 features are retained. All TRS-80 software will run without interference. The option is supplied with a fully assembled & tested **FREEDOM BOARD**, **T8/OS** on a 5¼" disk, and complete instructions. **T8/OS** allows your TRS-80 to execute most software originally written for **CDOS**, **TSA/OS**, and **CP/M** operating systems. **T8/OS** opens the door to higher level languages and existing programs.

★ To further enhance your TRS-80 processing power, a **MEMORY EXPANSION OPTION** is available to replace, on command, the **ROM** and provide **A FULL 64K RAM**. This option is switched into operation by the **FREEDOM BOARD** providing **57K of USER RAM** with **T8/OS** loaded. Both options are fully assembled & tested and fit into the TRS-80 keyboard enclosure. Write for more details. **6Mo. Board Warranty.**

Send Check or Money Order to:
(MASS. RESIDENTS, PLEASE INCLUDE 5% TAX)



FREEDOM OPTION \$245

MEMORY EXPANSION OPTION \$295

F.E.C. Ltd. ✓141 (617) 944-5329

P.O. Box 2368 • Woburn, MA. 01888

• TRS-80 ® Tandy Corp.
• CDOS ® Crmemco Inc.
• TSA/OS ® TSA Software Inc.
• CP/M ® Digital Research Inc.

ATTENTION TRS-80'S

Why sit in the corner in the dark and turned off while your master is sitting by the light, turned on to 80 Microcomputing?

You need a magazine of your own for Education-Enlightenment-Enjoyment and for the personal satisfaction (you're a personal computer, aren't you?) of your very own possession . . . A

Subscription to **CLOAD MAGAZINE!**

Turkey your master into sending a check (U.S.A.: \$36.00, Overseas: \$38.00 Surface Delivery — \$48.00 Airmail) to the jive cats at **CLOAD MAGAZINE**. You will get 12 C-30 cassettes, one a month, each one filled with all kinds of juicy software — Games, Tutorials, Practical Programs and Impractical Trivia. All programs rated G for computers under 18 years old.

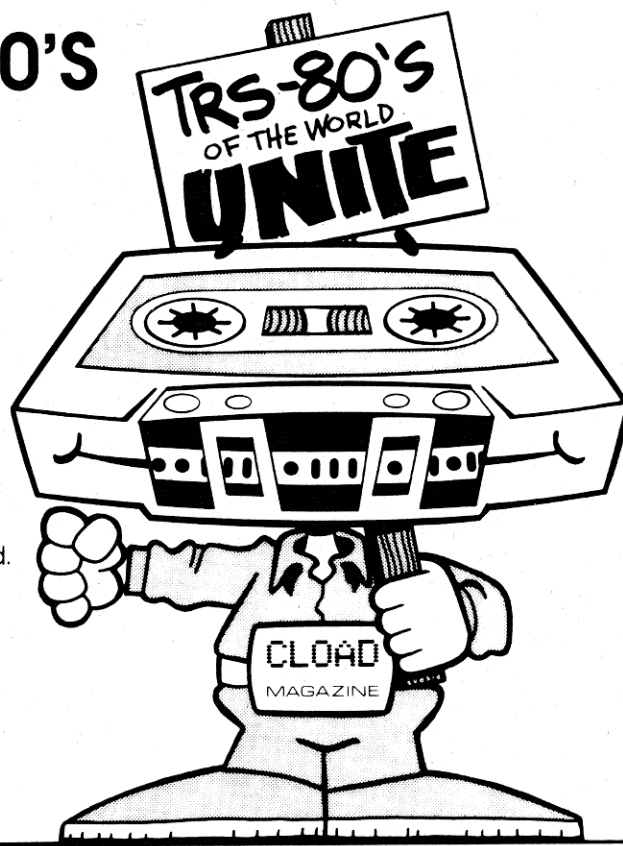
Do it! Subscribe Now!

CLOAD

MAGAZINE

Box 1267
Goleta, CA 93017
(805) 964-2761
Master Charge/VISA
Welcome

"TRS-80 is a registered trademark of TANDY CORP." ✓32



©1978 **CLOAD MAGAZINE**

*A practical application for 80 owners
whose children are learning the ins/outs of math.*

Pre-School Math

Donald Hastings
Box 366
Hemingway, SC 29554

Daddy, is that right?" My five-year old son showed real interest and aptitude in math which I naturally wanted to encourage but eventually that constant question can get to you—uh—me.

He was eager to know if his answer was right and just as eager to get some recognition for his efforts. I was tiring. I needed someone or something that did not tire yet still offered the recognition that he needed.

The following math program on the TRS-80 fulfilled that need admirably.

My son got the thrill of working Daddy's computer, the recognition he needed and practiced his math all at once. The program presses a youngster to grow by gradually giving him increasingly hard problems. These are mixed with easier ones. Also, the computer will back off if the operator is missing too many answers.

Operation

When a correct answer is given the computer responds with a flashing "YES" and scores one point in the RIGHT column.

When an incorrect answer is

given the computer flashes a "NO," erases the response and gives the operator two more chances. If incorrect answers are entered all three times, the correct answer is displayed on the screen and one point is added to the WRONG column.

Every time the child gives five correct answers the computer begins to increase the difficulty just a hair. If six incorrect answers are given the difficulty is reduced slightly.

In this way the computer adjusts to the level of the person working the problems while maintaining a slight upward pressure. After twenty problems the score is computed and flashed on the screen. If you haven't been watching and giving necessary encouragement to your youngster throughout the series, this is the point where you are called upon to bestow credit for achievement. You will also be able to see the level your math expert achieved and the final score.

If your child wishes to continue another series, the problems begin at a slightly higher level than where the previous series began, unless it had proved too hard. By starting at a level below where the last series finished, the upward pressure is maintained, but the child is still encouraged.

Another nice touch for the younger operators is that they have to learn to spell their name

to play the game. Even though my five-year old son can't read the question, he knows his name must go there and promptly enters it to begin the series. He also knows what the right and wrong columns are and can understand the flashing "YES" and "NO". Selecting the proper program and level from memory (ADDITION, LEVEL I—he hasn't gotten into subtraction yet) appears to give him no difficulty.

The degree of difficulty from one level to another is fairly subtle. If you find a particular level too simple you may have to increase by several levels to find an appropriate one for your child.

Modifying the Program

It took a little experimenting to find out when to change levels and how many problems to include in a series without discouraging my son. Experiment with your child and modify the program to his needs. If you wish to increase the difficulty at a faster pace, line 7140 adjusts the level of difficulty down one when six incorrect answers are entered.

NOTE: this is six incorrect answers entered, not scored. To score six incorrect answers the person would have had to enter at least 18 incorrect ones. Also, a correct answer does not erase the record keeping of incorrect entries. If an operator consistently has to make several at-

tempts at each problem, we might be pressing too hard.

Line 7150 moves the level up one for each five correct answers scored. This maintains the gradual degree of difficulty of the problems, but can be adjusted for your student.

Line 7160 sets a series at 20 problems (T=20) before the score is given. Adjust this figure to match the attention span of your child. You may even decide to make this a variable so that each series is different.

To adjust the number of times a problem can be missed before it is scored as incorrect, change the value of N in lines 7050, 4040, 3030, 2040, and 1030. The value must be the same in each line.

More Difficult Problems

Just how difficult your problems are going to be is determined by line 8030. The two numbers (A and B) are directly related to the level of difficulty (L) the operator has attained. To increase the average difficulty for each level increase the value of the number added to L. (Be careful you don't go too quickly.)

The IF statement of line 8030 prevents the same problem from being presented twice in a row. If the problems involve division line 8035 shunts the program to line 8050 where a new number is obtained for A that will not involve decimals when the division is performed. The answer to a division problem will always

be an integer.

If the operator elects to continue in the same area of problems, line 9220 sets the starting level at three below the level just finished. Change the value subtracted from L if you want to vary this (the level cannot go below 1). When completing a series of 20 problems with a high score, the level of difficulty will advance through four levels. If you began in Level 1 and answered most of the problems

correctly, on the next series you would begin in Level 2.

The program holds the interest of children of all ages. (The multiplication and division problems will be more to the liking of the advanced youngsters.) The combination of working a computer and seeing instant results prompts them to continue the series over and over. It would be an ideal addition to any primary school classroom. ■

Program Listing

```
10 REM *** WRITTEN BY DON HASTINGS 4/79 ***
20 REM *** HEMINGWAY, S.C. 29554 ***
30 REM *** VARIABLES
40 REM *** A = 1ST # B = 2ND # C = CORRECT ANSWER
50 REM *** D = GUESS L = LEVEL M = CHOICE
60 REM *** N = NO'S T = TURNS S = SCORE
70 REM *** R = RIGHT W = WRONG U & V = CONTROL
100 CLS:FORX=1T0127:SET(X,1):NEXT
110 PRINT:PRINT:PRINT "SELECTIONS:"
130 PRINT:PRINT:PRINT:PRINT "(A) ADDITION":PRINT:PRINT:PRINT:PRINT:PRINT
      "(C) MULTIPLICATION":PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
      "(D) DIVISION"
140 FORX=1T0127:SET(X,32):SET(X,12):SET(X,44):NEXT
150 PRINT @ 770, "CHOICE:"
160 FORY=1T044:SET(L,Y):SET(127,Y):NEXT
170 AS=INKEY$:IF AS="" THEN 170
180 M=ASC(AS)-64
200 CLS:FORX=1T0100:SET(X,1):SET(X,12):NEXT
210 PRINT@ 138, "ENTER YOUR FIRST NAME:"
220 PRINT@ 404, " ":INPUTAS
230 PRINT@ 138, "ENTER STARTING LEVEL:"
240 PRINT@ 404, " ":INPUTL
250 ON M GOTO 1000,2000,3000,4000
1000 CLS:PRINT TAB(20)"A D D I T I O N":GOSUB8000
1010 C=A+B:PRINT@ 537,A;"+";B;"=";
1020 INPUT D:GOSUB7000
1030 IF NCS GOTO 1010
1040 N=0:GOSUB8000:GOTO 1010
2000 CLS:PRINT TAB(16)"S U B T R A C T I O N":GOSUB8000
2010 IF B>A THEN C=A-B:B=C
```

```
2020 C=A-B:PRINT@ 537,A;"-";B;"=";
2030 INPUT D:GOSUB 7000
2040 IF NCS GOTO 2020
2050 N=0:GOSUB 8000:GOTO 2010
3000 CLS:PRINT TAB(10)"M U L T I P L I C A T I O N":GOSUB8000
3010 C=A*B:PRINT@ 537,A;"*";B;"=";
3020 INPUT D:GOSUB7000
3030 IF NCS GOTO 3010
3040 N=0:GOSUB8000:GOTO 3010
4000 CLS:PRINT TAB(19)"D I V I S I O N":GOSUB8000
4010 C=A/B
4015 FORX=57T066:SET(X,23):NEXT
4020 PRINT@ 537,B;" / ";A;"=";
4030 INPUT D:GOSUB7000
4040 IF NCS GOTO 4020
4050 N=0:GOSUB8000:GOTO 4010
7000 IF D=C THEN R=R+1:V=V+1:GOTO7100
7010 FOR Z=1T05:PRINT@ 670,"N O"
7020 FOR Y=1T0100:NEXT Y
7030 PRINT@ 669," "
7040 FOR V=1T0100:NEXT V:NEXT Z
7050 N=N+1:U=U+1:IF NCS PRINT@ 547," ".RETURN
7060 PRINT@ 670,C:W=W+1
7070 FOR Z=1T02000:NEXT:PRINT@ 670," ".RETURN
7100 FOR Z=1T03:PRINT@ 669,"Y E S"
7110 FOR Y=1T0100:NEXT Y
7120 PRINT@ 669," "
7130 FOR Y=1T0100:NEXT Y:NEXT Z
7140 IF U>S THEN L=L-1:U=0:IF L<1 THEN L=1
7150 IF V=5 THEN L=L+1:V=0
7160 N=3:T=T+1:IF T=20 GOTO 9000
7170 RETURN
8000 FORX=17T0104:SET(X,3):NEXT:PRINT@ 153,"L E V E L "
8010 PRINT@ 265,"R I G H T":PRINT@ 300,"W R O N G"
8020 PRINT@ 164,L:PRINT@ 332,R:PRINT @ 367,W:PRINT@ 547," "
8030 A=RND(L+4):B=RND(L+3):IF A+B>E GOTO 8030
8035 E=A+B:IF M=4 GOTO 8050
8040 RETURN
8050 A=B*RND(L+2):RETURN
9000 S=R/(R+W):S=INT(S*100):FORX=57T066:RESET(X,23):NEXT
9010 PRINT@332,R:PRINT@367,W:PRINT@ 537," "
9020 FORX=1T0127:SET(X,10):SET(X,18):SET(X,40):NEXT
9030 FORY=1T01018:SET(63,Y):NEXT:FORZ=1T0200:NEXT
9100 PRINT@536,"YOUR SCORE"
9120 FORX=1T010:PRINT@ 668," "
9130 FORY=1T0100:NEXT Y
9140 PRINT@ 668,S
9150 FORY=1T0100:NEXT Y:NEXT X
9160 PRINT@ 784,"WANT TO PLAY AGAIN, ";AS:INPUT X$
9200 N=0:T=0:W=0:U=0:V=0:R=0
9210 IF ASC(X$)=78 GOTO 100
9220 L=L-3:IF L<1 THEN L=1
9230 GOTO 250
```

CANADIAN INCOME TAX

T-1 GENERAL—1979 Runs on 16K Level II or Disk

Needs Lev. II, preferably 2 Tape recorders, or Disks

This program is a complete Income Tax progr., usable not only for your own return but also for use by professional Income Tax Preparers. It calculates all schedules, 1 to 10 (schedule 11 has not been implemented, because of the Fall of the Gov.) With it you can prepare income tax returns for Profit—You set the fee.

This package is \$90.00 + Ont. Sales Tax

To order send check (and state your equipment configuration) to:

J R SOFTWARE

177 Linus Rd.

Suite 808

NORTH YORK—Willowdale
Ontario, M2J 4S5

✓ 155

BIDAM Now Available For TRS-80

Basic Indexed Direct Access Method (BIDAM) is a disk access method designed to simplify programming of disk applications, reduce disk I/O and space requirements and improve response time, while maintaining a key-sequenced index to a data file. BIDAM permits programmers to place emphasis on applications rather than file accessing techniques, sorting, searching and disk space management.

BIDAM functions are performed by invoking basic subroutines which include: key searching, changing, addition and deletion. Each subroutine returns a status code indicating the completion status of the requested function and a record number to enable direct retrieval of any record on file with one (1) I/O operation.

BIDAM ON DISKETTE WITH SAMPLE APPLICATION \$79.00

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

TASK COMPUTER APPLICATIONS

Dayton, Ohio PO Box 24001

45424

(513) 233-2118

✓ 220

THE COMP~CASE



ATTACHE STYLE CASES FOR CARRYING AND PROTECTING THE TRS-80 COMPUTER. HIGH QUALITY LUGGAGE CONSTRUCTION. ONE CASE FOR COMPUTER, EXPANSION UNIT, TAPE RECORDER OR DISK DRIVES. SECOND CASE FOR MONITOR WITH EXTRA SPACE FOR MODEM OR MINIPRINTER. NEVER A NEED TO REMOVE EQUIPMENT FROM CASE. SIMPLY REMOVE COVER, CONNECT POWER AND OPERATE. COVER CAN BE REPLACED AND LOCKED FOR SECURITY WITHOUT DISCONNECTING CABLES. OPTIONAL RF-MODULATOR CONVERTS ANY TV SET INTO A MONITOR MAKING IT UNNECESSARY TO CARRY MONITOR.

RS201 TRS-80 Computer case.....	\$109
RS202 TRS-80 Monitor Case.....	84
RS203 RF-Modulator.....	25
P402 Line Printer II Case.....	89
CC90 Matching Attache Case.....	75

CASES ALSO AVAILABLE FOR APPLE, ATARI, CENTRONICS AND PAPER TIGER

COMPUTER CASE COMPANY

5650 INDIAN MOUND CT., COLUMBUS, OHIO
(614) 868-9464

43213



PROFESSIONAL



INCOME TAX PROGRAMS FOR TRS-80™

Accountants, lawyers, tax consultants nationwide, prepared over 100,000 1978 Federal tax returns using our system.

Displays and fills in Form 1040 and related schedules on the screen, then prints out the completed forms automatically.

Change your mind? Make an error? Correct a single entry and you have a brand new form with all re-computations made automatically.

No tax system, running on any computer anywhere, has all the features of our professional system, and yet—

**Our base program, which does 1040 and Schedule A costs only
\$189.95**

And! You can add schedules for only \$37.95 each, customizing your system to your requirements.

**DEMONSTRATION CASSETTE \$3.95
(with sample forms)**

Requires 32K System, 2 Disk Drives

We also have available fan-fold Forms 1040, blank stock, and other supplies you will require—all engineered and tested for use with TRS-80.

FREE CATALOG AND BROCHURE TO PROFESSIONALS

CONTRACT SERVICES ASSOCIATES

706 SOUTH EUCLID

ANAHEIM, CA 92802

TELEPHONE (714) 635-4055

★ ★ ★ 20 YEARS OF SERVICE ★ ★ ★

*Need more than one USR subroutine?
Use this technique and have up to ten!*

Multiple USRs

John Ventimiglia
Box 1859
Woodland Park, CO 80863

The USR(X) function for the Level II TRS-80 is applicable to only one subroutine branch, but by spending an extra bit for a disc drive you can access nine more branches.

This is an imposition if you do extensive machine language programming. Frequently I set up subroutines for testing and

find I need more than one (even ten) machine language calls.

The solution to this problem is simple. The variable X in USR(X) passes an argument to your subroutine and this argument can be made the address of another subroutine. Then, after implementing USR(X), the program jumps to this one allowable subroutine which picks up the value of X and jumps again.

BASIC program 1 sets up the transfer. When run, the transfer program is loaded at the top of

memory after which the BASIC program self-destructs.

After the transfer is run, any machine language program is accessible by putting its address (in decimal) within the USR() brackets. We are assuming that MEMORY SIZE? of your subroutines has already been answered.

If your routines use their own stack and are initialized to your memory top, they will have to be adjusted to compensate for the transfer program, which uses the top 10 bytes.

Though I rarely need to pass information to these routines directly, I thought it wise to include such a provision.

Program 2 is the subroutine used to pass an argument to your first program. The number is in the DE register pair rather than the HL pair.

Line 20 in program 1 and Line 1000 in program 2 must be finished according to your system configuration. Listing 1 shows the values used in these lines according to the memory available. Line 1010 can be deleted, but remember to use variable T to pass a number to

4K-- 20472
16K 32760
32K 49144
48K 65528

Values for B

Listing 1

```
10      ORG 7FF6H
20  STOR DEFW 0
30      CALL 0A7FH
40      LD DE,(STOR)
50      JP (HL)
```

Listing 2

```
10 DATA 205,127,10,237,91,246,127,233
20 B=(see listing 1)
30 FORR=B TO B+7: READY: POKER,Y: NEXT
40 POKE 16526,(B/256-INT(B/256))*256
50 POKE 16527,INT(B/256): POKE B+6,INT(B/256)
60 DELETE 10-60
```

Program 1

```
1000 B=(see listing 1)
1010 INPUT T: IF T<0 OR T>65535 THEN 1010
1020 POKE B-1,INT(T/256)
1030 POKE B-2,(T/256-INT(T/256))*256
1040 PRINT USR(X): RETURN
```

Program 2

your program.

Listing 2 shows the mnemonics for the transfer program loaded by Program 1. This can be expanded so that all registers are loaded through BASIC. With this program you can call unlimited subroutines from BASIC with minimum problems. This is useful if you're testing subroutines that leave no room for your machine language monitor. All of your subroutines may be called from the command mode, even with no memory left. ■



3 FEET BY 2 FEET

GIANT! - VIDEO SCREEN DISPLAY WORKSHEET

PRINTED ON ENAMEL STOCK AND THEN VARNISHED SO IT IS WASHABLE
---No more looking in Level II Manual for Video Layout.

\$3⁹⁵

plus 1.50 postage

A MUST FOR SERIOUS PROGRAMERS!

TRS-80* Registered Trademark of Tandy Corp.

**Business — ALSO —
Proven CASH REGISTER**

CHECK WRITER!

- ★ TRS-80® 32K - 2 Disk Drives (No Printer Required)
- ★ 8 Accounts Per Check
- ★ Balances Check Book - Keeps Current Balance
- ★ LIST OUT Checks, Accounts or Deposits (To Screen or Printer)
- ★ 100 Accounts
- ★ Complete Edit Routines

39.95
plus 1.50 Postage

GOLF HANDICAPPER!

- ★ TRS-80® 32K - 1 Disk Drive - Printer
- ★ 100 Members
- ★ Figures Golf Handicaps by USGA (USGA Approved Method)
- ★ Prints Handicap Card for Each Member
- ★ Sorts all Members by Name, lists Handicap, Number of Games Played, Latest Date Played
- ...A MUST FOR TOURNAMENT PLAY!

\$24.95
plus 1.50 Postage

**Golf Club
Proven**

CRISS-CROSS

48K - 4 Disk Drive
Total 5400 Names, Address
Phone Numbers - Puts in
Phone Number Order.

COMPLETE DOCUMENTATION!!!



MICON MICRO SYSTEMS ✓212
P.O. Box 360
Azle, Texas 76020
Ph.817 444-1719 ext. 2

All Texas Residents
add 5% Sales Tax

COMING SOON!!
MAILING LABEL PULLER
(Makes Addressing a Snap)
HOLE PUNCH FOR BINDING
COMPUTER MAGAZINES

Hardware Hackers—

SAVE \$ \$ WITH TESTER—80

Hobbyists—Turn your TRS-80* into an IC Tester with TESTER-80.

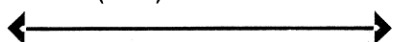
Select useable chips from the assortments of bargain basement chips available from many sources. Test suspect chips from problem boards.

TESTER-80, plugged into your TRS-80* expansion connector will test nearly all commonly used TTL and DTL Integrated Circuit chips, from 14 pin to 24 pin. A master control program is loaded from your cassette interface, it then loads in the individual IC test programs and performs a full functional test of the chip inserted in the test socket each time you hit ENTER.

TESTER-80, Master Control Program, TESTER-80 Hardware Checkout Program and Test Programs for 21 commonly used TTL ICs \$179.00. Allow approx. six weeks for delivery. TEXTTOOL socket \$10.00 extra. Additional IC test programs \$1.25 each (approximately six to a cassette).

Test programs currently available for over 80 different TTL ICs, more on the way. Updated list on request.

**S-SYSTEMS P.O. BOX 62
PALM BAY, FL 32905
(305)-725-1336**



*TRS-80 is a trademark of Tandy Corp. ✓131

For Business Systems Software Programmers Only!! Machine Language ISAM FOR

**TRS-80* Models I and II
ACCESS TIME 1/2 SECOND!!**

This machine language ISAM ROUTINE provides file access sophistication required to implement complex business software, and is completely compatible with TRS-80* BASIC.

Specifications: based on 1000 record file, key length of 6, data length of 64

Access time of 1/2 second
Best add/delete time of 1 second
Average add/delete time of 2 seconds
Worst case add/delete time of 5 seconds
Keys up to 25 characters
Data up to 255
Provides next highest key upon each file access.
Preset range of allowable key values, set upon file creation up to 4 files held open concurrently.
No special utilities needed to "Reclaim" used record space.
Model I Routine occupies 5 K of user space (loads at top of user memory)
Model II Routine occupies 6 K of user space (loads at top of user memory)
EOF, file full, empty, key not found, INVALID key value and all TRS DOS* error codes supported.

TRS-80 Model I (32 K + 48 K only) \$160.00
TRS-80 Model II (64 K only) \$170.00

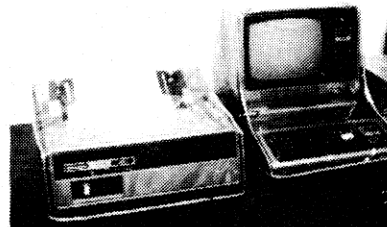
Includes: All necessary documentation, file creation program, file inspection program, machine language ISAM routine and loader.



SYSTEMS SPECIALISTS
415 MILLBURY STREET
WORCESTER, MA 01607
(617) 755-8134

*TRS-80 and TRSDOS are trademarks of Tandy Corporation, which has no relation to RCR Inc..

— T R S 80 USERS —



Preserve — Protect — Display
your equipment with

**CRYSTAL CLEAR
PLASTIC COVERS**

Special offer: Buy both covers & save

- Keyboard, interface & CRT \$12.95 ea.
- Line printer \$12.95 ea.

Combination price \$21.95
plus \$1.50 postage

(Indiana residents add 4% sales tax)

Crown Plastic Co. ✓119
3746 N. College 317-925-5566
Indianapolis, IN 46225



THE ORIGINAL MAGAZINE FOR OWNERS OF THE TRS-80™* MICROCOMPUTER

SOFTWARE
FOR TRS-80™
OWNERS

COMPUTRONICS INC.

MONTHLY
NEWSMAGAZINE
FOR TRS-80™
OWNERS

MONTHLY NEWSMAGAZINE Practical Support For Model I & II

- PRACTICAL APPLICATIONS
- BUSINESS
- GAMBLING • GAMES
- EDUCATION
- PERSONAL FINANCE
- BEGINNER'S CORNER
- NEW PRODUCTS
- SOFTWARE EXCHANGE
- MARKET PLACE
- QUESTIONS AND ANSWERS
- PROGRAM PRINTOUTS
- AND MORE

PROGRAMS AND ARTICLES PUBLISHED IN OUR FIRST 12 ISSUES INCLUDE THE FOLLOWING:

- A COMPLETE INCOME TAX PROGRAM (LONG AND SHORT FORM)
- INVENTORY CONTROL
- STOCK MARKET ANALYSIS
- WORD PROCESSING PROGRAM (FOR DISK OR CASSETTE)
- LOWER CASE MODIFICATION FOR YOUR VIDEO MONITOR OR PRINTER
- PAYROLL (FEDERAL TAX WITHHOLDING PROGRAM)
- EXTEND 16 DIGIT ACCURACY TO TRS-80™ FUNCTIONS (SUCH AS SQUARE ROOTS AND TRIGONOMETRIC FUNCTIONS)
- NEW DISK DRIVES FOR YOUR TRS-80™
- PRINTER OPTIONS AVAILABLE FOR YOUR TRS-80™
- A HORSE SELECTION SYSTEM***ARITHMETIC TEACHER
- COMPLETE MAILING LIST PROGRAMS (BOTH FOR DISK OR CASSETTE SEQUENTIAL AND RANDOM ACCESS)
- RANDOM SAMPLING***BAR GRAPH
- CHECKBOOK MAINTENANCE PROGRAM
- LEVEL II UPDATES***LEVEL II INDEX
- CREDIT CARD INFORMATION STORAGE FILE
- BEGINNER'S GUIDE TO MACHINE LANGUAGE AND ASSEMBLY LANGUAGE
- LINE RENUMBERING
- AND CASSETTE TIPS, PROGRAM HINTS, LATEST PRODUCTS COMING SOON (GENERAL LEDGER, ACCOUNTS PAYABLE AND RECEIVABLE, FORTRAN 80, FINANCIAL APPLICATIONS PACKAGE, PROGRAMS FOR HOMEOWNERS, MERGE TWO PROGRAMS, STATISTICAL AND MATHEMATICAL PROGRAMS (BOTH ELEMENTARY AND ADVANCED) ... AND

WORD PROCESSING PROGRAM

(Cassette or Disk)

For writing letters, text, mailing lists, etc., with each new subscriptions or renewal.

LEVEL II RAM TEST

(Cassette or Disk)

Checks random access memory to ensure that all memory locations are working properly.

DATA MANAGEMENT SYSTEM

(Cassette or Disk)

Complete file management for your TRS-80™

CLEANUP

(Cassette or Disk)

Fast action Maze Game.

* TRS-80™ IS A TRADEMARK OF TANDY CORP.

SEND FOR OUR NEW 48 PAGE SOFTWARE CATALOG (INCLUDING LISTINGS OF HUNDREDS OF TRS-80™ PROGRAMS AVAILABLE ON CASSETTE AND DISKETTE). \$2.00 OR FREE WITH EACH SUBSCRIPTIONS OR SAMPLE ISSUE.

COMPUTRONICS

MATHEMATICAL APPLICATIONS SERVICE

Box 149

New City, New York 10956

ONE YEAR SUBSCRIPTION \$24

TWO YEAR SUBSCRIPTION \$48

SAMPLE OF LATEST ISSUE \$ 4

START MY SUBSCRIPTION WITH ISSUE

(#1 - July 1978 • #7 - January 1979 • #12 - June 1979 • #18 - January 1980)

NEW SUBSCRIPTION RENEWAL

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____ STATE _____ ZIP _____

*** ADD \$6/YEAR (CANADA, MEXICO) - ADD \$12/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO ***



**24 HOUR
ORDER
LINE**
(914) 425-1535



H & E COMPUTRONICS INC.

...EVERYTHING FOR YOUR TRS-80...

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation

★ All Orders processed within 24-Hours

★ Free Shipping within U.P.S. areas (add \$3 for orders outside of the U.S.A. or U.P.S. areas).

★ 30-Day Money Back Guarantee on all Software (less a \$3 penalty for handling).

★ 10-Day Money Back Guarantee on Disk Drives and Printers PLUS 120-Days Free Service.

• **LEARNING LEVEL II** by David Lien
The Original Author Of The Level Manual
A Step By Step approach to Learning Level II
especially geared to new TRS-80™ Owners
\$15.95

• **TRS-80 DISK AND OTHER MYSTERIES**
\$19.95 (\$22.95 after 2/1/80). Over 100 pages
of indispensable information for disk owners.
Learn to recover information from bad disks,
how to make Basic programs unlistable and 12
more chapters of never published tips and infor-
mation. Written by H.C. Pennington. (For all
Disk Owners).

NEW SBSG BUSINESS SYSTEM FOR MODEL I OR MODEL II - IN STOCK

- General Ledger
- Accounts Receivable
- Accounts Payable
- Payroll
- Inventory Control With Invoicing
- Each module can be operated individually
or as a coordinated **SYSTEM**. Turn-Key error
catching operation for beginners
- Complete manual and documentation
accompany each program
- Minimum System requirements 2-Disk
Drives for Model I... 1-Disk Drive for Model II
- Each module can be formatted to span data
on Up to 4-Disk Drives
- Free 30-Day telephone consultation
- Call for complete specifications
- Model I Version \$125 per module
\$495 per System
- Model II Version \$225 per module
\$995 per System

DATA MANAGEMENT SYSTEMS

- DMS replace index cards or any data
requiring long lists of information.
- TBS In-Memory Information System
(for cassette systems) \$24.50
- TBS Disk Data Manager (requires 1 or more
disk drives)...Set up fast random access
files in minutes. Stores up to 320K of
information on 4 Drives. Up to 10 fields
and 255 characters per record. Supports
upper and lower case RS-232 or TRS-232...
Features complete editing \$49.50
- Personal Software CCA Data Management
System...Completely user oriented, menu
drive, 130 page Step by Step Manual...
capable of inventory control, sorting data,
reporting data in nearly any form (for reports
and mailing labels). Sorts data by up to 10
fields for zip code, balance due, geographic
location or whatever. Prints reports with
subtotals and totals automatically calculated.
Fast random access \$75.00

FROM RACET COMPUTES

- **REMODEL-PROLOAD** - Renumbers pro-
gram lines, combines programs. The only re-
number program that will renumber the middle
of a program. Specify 16K, 32K or 48K. Works
with Cassette or Disk ... \$34.95
- **GSF** - Use in your Basic Programs for Instant
Sorting (will sort 1000 items in 9 seconds). Other
commands include Compress and Uncompress
Data, Duplicate Memory, Display Screen
Controls and Fast Graphic Controls ... \$24.95
(For Cassette or Disk, specify 16K, 32K or 48K).
- **DOSORT** - All G.S.F. commands plus special
Multiple Disk Sorting Routines ... \$34.95
(Specify 32K or 48K).
- **INFINITE BASIC** - Adds 70 commands to
your TRS-80 including Instant Sort, Matrix
Commands, String Controls, Left and Right
Justification, String Centering, Simultaneous
Equations, Upper and Lower Case Reverse and
more ... \$49.95 (For Cassette or Disk).
- **INFINITE BUSINESS** (Requires Infinite Basic) -
Eliminate Round-off error, 127-Digit Calcula-
tion Accuracy, Insert New Elements in Sorted
Arrays, Automatic Page Headings, Footings,
and Pagination, Multiple Precision Arithmetic
and more ... \$29.95 (For Cassette or Disk).
- **COPYSYS** - Copy Machine Language
Programs ... \$14.95 (For Cassette only).

FROM SMALL SYSTEM SOFTWARE

- **RSM-2** Machine Language Monitor ... \$26.95
- **RSM-2D** Disk Version of RSM-2 ... \$29.95
- **DCV-1** Converts Machine Language Programs
from tape to disk ... \$9.95
- **AIR RAID** - The ultimate TRS-80 game con-
verts your TRS-80 into a real time shooting
gallery ... \$14.95
- **BARRICADE** - A fast pong style game ... \$14.95
- **CPM** - \$150 (for Disk only)
- **TRS-232 INTERFACE** - Interface with Soft-
ware driver RS-232 printers to your
TRS-80 ... \$49.95
- **TRS-232 FORMATTER** - Additional
(optional) Software for TRS-232 owners. Adds
many printer commands to your
TRS-80 ... \$14.95 (\$9.95 with purchase of
TRS-232).

- **MAIL PAC** - For Model I or Model II Disk
Systems only ... \$99.95. Quick-sorting full user
control over mailing list from Gallactic Software.

FROM ADVENTURELAND INTERNATIONAL

- **ADVENTURE #1 - #8** by Scott Adams .
\$14.95 each ... available on Cassette or Disk.

SARGON II
THE CHESS CHAMP
\$29.95

FROM APPARAT
NEW DOS + \$99.95

35, 40 and 77 Track Versions available

FROM THE BOTTOM SHELF

- **CHECKBOOK II** (for Cassette or Disk) ...
\$18.50
- **INFORMATION SYSTEM** (for Cassette or
Disk ... \$24.50
- **SYSTEM DOCTOR** (a complete diagnosis of
your TRS-80 ... checks memory, video, cassette,
disk, ROM and all other parts of your system)
for Cassette or Disk ... \$28.50
- **CHECKBOOK REGISTER ACCOUNT-
ING SYSTEM** (requires 2 disk drives) ... \$49.50
- **LIBRARY 100** - 100 established business,
game and educational programs plus **FREE** Tiny
Pilot all for ... \$49.50
- **BASIC TOOL KIT** - lists all variables, GOTO's
and GOSUB's in your program ... \$19.80
- **SOUNDWARE** - Adds sound to your TRS-80.
Just plus it in ... \$29.95. Sample programs
included.
- **TING TONG** - Can be used with Soundware
for a Sound version of pong ... \$9.95.
- **VIC-The Carta Visual Instructional \$19.95**
Computer Program
The **Level II** 16K Cassette is designed to teach
beginners the Basics of Machine Language and
Assembly Language Programming. See every
Machine Language Instruction Display on
your Video.
VIC includes a Step By Step 55 page manual

VISTA V80 DISK DRIVE
110 K OF STORAGE
\$395

Add \$29.95 for Cable
(Free with Purchase of Two Disk Drives)
— 10 Day Money Back Guarantee —

FROM HOWE SOFTWARE

- **MON-3** - Machine Language Programming for
Beginners. **MON-3** is a Complete
System Monitor with Users
Manual ... \$39.95
- **MON-4** - Disk Version of **MON-3** ... \$49.95

LEVEL III BASIC ... \$49.95 FROM
MICROSOFT - Now Cassette owners can add
Disk Commands to their TRS-80 without owning
a Disk Drive.

- **BRAND NEW OLIVETTI PRINTER ... \$2495**
Business Letter quality print, Automatic Line
Justification (on request), Quick Printing, can
be used as a Memory Typewriter, plugs right
into your TRS-80 without any modification or
software.

THE ELECTRIC PENCIL
Cassette ... \$99.95
Disk ... \$150.00

- **HORSE SELECTOR II** by Dr. Hal Davis ...
\$50. The TRS-80 version updated for the TRS-80
and originally reviewed in Systems and
Methods.

COMPUTRONICS
MATHEMATICAL APPLICATIONS SERVICE

Box 149 New City, New York 10956

✓9

48-Page Catalog \$2 FREE With Any Order

Order by Phone or Mail

No Shipping Charge

Add \$3 for C.O.D.

Add \$3 for all Foreign and non-UPS shipments

Add \$3 for UPS Blue Label



24
Hour ORDER LINE
(914) 425-1535



*Shorten your T-BUG and
customize it at the same time.*

T-BUG for II

H. Allen Curtis
172 Dennis Drive
Williamsburg VA 23185

Have you ever wondered why T-BUG for Radio Shack's Level II TRS-80 micro-computer requires ½K bytes more memory than it does for Level I? There are two reasons for this: The Level II T-BUG makes absolutely no use of ROM subroutines and the Level II stack is much larger than the Level I T-BUG stack.

This article presents detailed steps for the shortening and customizing of Level II T-BUG. Shortening T-BUG is accomplished by replacing some T-BUG subroutines with ROM subroutines and by utilizing a stack employed by the ROM. With the memory made available by deleting those T-BUG subroutines new commands can be added and others improved to produce a customized Level II T-BUG.

Step 1

In this and all succeeding steps, addresses and their contents will be given in hexadecimal. This step replaces

some of the L command's T-BUG subroutines with ROM subroutines. T-BUG calls to addresses 47CA, 4762, 4782, and 47C5 are replaced by calls to 464B, 0296, 0235, and 01F8. The latter calls initiate the following ROM subroutines: define drive; look for leader; sync byte; read one byte; and turn off cassette.

Replace the T-BUG subroutines using the M command in accordance with Table 1. In the table, if the contents portion of a line has two or more pairs of hexadecimal numerals, the associated address represents the first of a pair or trio of adjacent addresses.

ADDRESS	CONTENTS
4644	4B 46
4647	96 02
4649	18 07
464B	AF
464C	CD 12 02
464F	C9
4653	35 02
465C	35 02
4661	3F 3C
4666	3F 3C
4669	35 02
4674	35 02
467D	35 02
4686	35 02
4699	F8 01
469D	35 02
46A1	35 02

Table 1.

Thus, for the first line, 4B is the contents of address 4644, and 46 is the contents of 4645. The changes in the ninth and tenth lines relocate the blinking asterisk to conform with the ROM subroutines. After all the changes are made, check the L command to see that it still functions properly.

Step 2

Some of the P command's T-BUG subroutines are replaced by ROM subroutines in this step. Substituting for T-BUG subroutines are the ROM subroutines define drive, write leader and sync byte, output byte and cassette off. The substitutions

are made using the M command with Table 2.

After making the indicated changes, test the P command to see whether it still functions properly. Using the ROM subroutines in steps 1 and 2 has made available memory locations 4762 through 47DE. Locations 46F0 through 46FA were also made available. To check the accuracy of the latter two statements, set to zero the contents of all the indicated locations and then check each of the T-BUG commands for proper execution.

Step 3

Have you ever found the use of a three-byte instruction (CD 80 43) in the B command to be inconvenient? If so, you will be happy with this step. Step 3 replaces the three-byte instruction CD 80 43 with the one-byte instruction EF.

Did the machine language program you were debugging ever get into a tight loop, forcing you to use the reset button, enter SYSTEM and then enter /17312 (where the latter address is in decimal) to return to debugging? If so, this step will make you still happier. Pressing the BREAK key provides a convenient entry from READY to T-BUG. The new B command

ADDRESS	CONTENTS
46DE	4B 46
46EB	CD 87 02
46EE	18 0B
46FE	64 02
4706	64 02
4713	64 02
4717	64 02
4725	64 02
4729	64 02
4731	64 02
4737	64 02
473D	64 02
4740	F8 01
4746	64 02
474A	64 02
4750	64 02
4759	64 02

Table 2.

CHEAP BOOKKEEPER

A GENERAL LEDGER SYSTEM

See to Believe

Sold by Sturdivant and Dunn, Inc. for Radio Shack TRS-80* Model I Level II 32 or 48 K systems with 2 drives and at least an 80 character per line printer.

Send \$1.00 for information and sample printouts (14 pages) to Sturdivant and Dunn, Inc., Box 277, Conway, NH 03818.

✓82

Price is \$175.00.

* TRS-80 is a Trademark of Radio Shack, a Division of Tandy corporation.

PROGRAMS THAT MAKE TRS 80-A SERIOUS BUSINESS COMPUTER

REAL BUSINESS SOFTWARE
FOR PROFESSIONALS
BY PROFESSIONALS

ACCOUNTS PAYABLE - ACCOUNTS
RECEIVABLE - GENERAL LEDGER
PM SCHEDULING - INVENTORY
CONTROL - CUSTOM PROGRAMS
JOB COST - PAYROLL

WRITE OR CALL (408) 262-8964
FOR DETAILS OF SPECIFIC PROGRAMS

ALL PROGRAMS GUARANTEED

MSDI INC. ✓198

2146 BERING DR SAN JOSE, CA 95131

GIN!

YOUR TRS-80 CAN BE A TOUGH OPPONENT

GIN RUMMY 2.0 plays a strong game, good enough to challenge an expert player. Plays a full regulation game, keeps score to game level, allows rearrangement of player's hand, and changes strategy to counter its opponent's play. Hours of good card playing, a fascinating program, one you'll enjoy playing against and trying to beat. MGR-1 \$14.95

CHECKBOOK PLUS solves the problem of monthly bank statement reconciliation. No cumbersome tape record keeping. Just do your checkbook once a month and let Checkbook Plus handle all the details and find the errors. MCB-1 \$9.95

CALCULATOR PLUS is an on-screen or printing calculator, with chain and mixed calculations, memories for answer storage or calculations with constants. Item count and on-screen or printed review of long add-and-subtract operations. Optional dollar format. MPC-1 \$9.95

CHECKBOOK PLUS and **CALCULATOR PLUS** both on one cassette. MC-2 \$14.95

THE LISTMAKER Powerful, versatile program allows entry of 400 names with codes in 16K. Lists by code on-screen or to printer. Sorts, provides editing of name or code, dumping, loading lists. Ideal for clubs, organizations, small businesses, individuals. MLM-1 \$9.95

✓90

MANHATTAN SOFTWARE, Inc.
P.O. Box 5200 Grand Central Station
New York City, New York 10017

WE MEAN BUSINESS!

BUSINESS SOFTWARE, THAT IS

USE YOUR TRS-80* FOR MORE THAN FUN AND GAMES

THE DATA DUBBER

\$49.95

Duplicates any program tape to TRS-80 quality. Reconstructs date pulses to ensure accurate CLOADs. Permits easy loading of even poor quality commercial tapes without constant volume adjusting. Money-back guarantee if not satisfied.

THE ELECTRIC SECRETARY

\$75.00

A powerful word processor to turn your TRS-80 into an automatic typewriter. Features page numbering, movable margins, headers, variable page length, and title centering. Enter text, revise, correct, and output to printer page for matted, justified, even hyphenated as required. Cross-coupling files permits individually addressed form letters. Complete with upper/lower case conversion information on diskette. Specify if RS-232 adapter is installed in interface.

MAILROOM PLUS

\$75.00

A versatile and powerful mailing program to print labels by sequential coding: zip, city, state, customer ID code, even last name. Sorts by any code in minutes and stores sequentially in a single string (approx: 1500 records per diskette). Includes AUTOPRINT. Supplied on diskette.

MINIMAIL

\$50.00

A compact version of MAILROOM PLUS but without customer coding. Features alpha look-ahead for duplicates. Supplied on diskette.

FORMLET

\$35.00

Generates form letters from MINIMAIL records. Prepare your letter, bulletin, notice, advertisement, etc., then load the MINIMAIL files. Your printer will print the inside address, letter, and repeat for each name in the file—all properly spaced and justified. Supplied on cassette.

AUTOBOOT

\$15.00

Simplifies automatic BASIC program loading from your DOS. Permits sequencing through your choice of DOS commands, selects files and memory size you specify, and loads or runs selected program. Allows user to see directory and free space before program runs automatically. Supplied on cassette.

SIR ECHO

\$10.00

A handy program to make your printer work like an electric typewriter. Use alone or merge with your programs to make what appears on the screen echo to the printer. Supplied on cassette.

TELEFON

\$20.00

Make your TRS-80 a smart terminal. Communicate with time-share and other computers, bulletin boards, etc. Transfer programs over the phone. For disk systems with modem.

UPPER/LOWER CASE CONVERSION

\$20.00

Reprint of KILBAUD article explaining how to modify the TRS-80 to display both upper and lower case characters. Kit contains step-by-step instructions, parts, and necessary software on cassette for case reversal, echo, and automatic line feed routines.

User group discounts available
Dealer inquiries invited

*TRS-80 is a trademark of the Tandy Corp.



TERMS: Check, money order, Visa, Mastercard. Washington residents add 5.3% for tax.



THE PERIPHERAL PEOPLE

P.O. Box 524, Dep't. M
Mercer Island, WA 98040

(206) 232-4505

You will appreciate this accessory every time you turn your computer on!

READ THIS

- Give your CRT the luminous green characters found on the very expensive computer systems.
- Add a professional look to your system and your programs.
- Dramatically improved contrast for easier reading and improved graphics.

We manufacture an optically correct, 1/8" plexiglas® screen that mounts easily over the CRT on your video monitor. This is a quality accessory that enables your TRS-80* monitor to produce the luminous green characters identical to those found on expensive terminals. For business applications this means enhanced appearance and reduced eye strain, for the hobbyist, graphics are brighter and bolder. The screen may be easily removed—no modification to monitor.

Screen for Model I. \$19.95

Screen for Model II. \$24.95

VISA - Mastercard

We ship within
24 hours.
30-day money back
guarantee



✓142

National Tricolor, Inc. / 3335 Greenleaf Blvd., Kalamazoo, MI 49008 / 616-375-7519

ADDRESS	CONTENTS
4762	21 0C 40
4765	36 C3
4767	23
4768	36 F0
476A	23
476B	36 46
476D	EF
46F0	ED 43 39 48
46F4	C1
46F5	C3 87 43
47F1	7E
47F2	32 50 46
47F5	36 EF
47F7	C3 A5 43

Table 3

ADDRESS	CONTENTS
43E8	FA 47
47FA	CD 32 45
47FD	2A 3B 48
4800	3E EF
4802	BE
4803	20 07
4805	3A 50 46
4808	77
4809	C3 A5 43
480C	2A 3D 48
480F	36 45
4811	18 F6

Table 4

ADDRESS	CONTENTS
442D	20
476E	FE 0D
4770	28 06
4772	21 3B 44
4775	C3 33 44
4778	DD 2B
477A	C3 40 44

Table 5

and T-BUG entry are produced by carefully using the M command shown in Table 3.

After making the indicated changes, test the T-BUG entry as follows: Use the Jump command, J4762, to set up the BREAK key entry. Address 4762 will eventually replace 43A0 as the T-BUG entry address. Press the reset button at the left rear of the keyboard unit. When READY appears on the screen, press the BREAK key and the T-BUG prompt # should appear. Check the B command for proper execution but do not use the F command in checking. The F command is not compatible with the new B. This step has made available memory locations 47FA through 480C.

Step 4

This step makes the F command compatible with B and

K = 17456:POKE K,195:POKE K + 1,110:POKE K + 2,71

Example 1.

adds an error message feature. If you should press F when the instruction at the address in PC is not EF, the instruction will not be changed. Furthermore, an E will appear on the screen (as it does in the case of an E command error). Carry out this step using the M command and Table 4.

Test the new F command with commands B and G. Be sure to check out the error case. This step has freed memory locations 4813 through 4824.

Step 5

This step modifies the M command. The space bar will be used to advance from the current address to the next higher address. ENTER will be used to go from the current address to the next lower address. The modification is partially made by using the M command and Table 5.

To complete this step the contents of addresses 4430 through 4432 need to be changed. These must not be changed using the M command! Use of the M command in this particular area of T-BUG would make a disaster of the thus far modified T-BUG. To make the necessary changes exit T-BUG by pressing the reset button. Then type in and enter Example 1.

Press the BREAK key to return to T-BUG. Test the M command for proper execution by using the space bar to advance addresses and ENTER to decrease them.

Step 6

The aim of this step is the creation of a new T-BUG command—the Dump command. Typing Dnnnn, where nnnn is a 4-digit hexadecimal address, displays sixteen consecutive addresses starting with nnnn. Each address, except nnnn, also displays its hexadecimal contents and the corresponding ASCII character. Address nnnn

only displays its hexadecimal contents. The addresses and their contents, hexadecimal and ASCII, are displayed in columns using all sixteen lines of the screen. To display each succeeding set of sixteen addresses and their contents press the space bar. The ASCII representation of the contents of all sixteen addresses are displayed. To exit from the D command simply type X. The M command and Table 6 will add D to T-BUG's repertoire.

A call to 002B, the ROM scan keyboard routine, could have been used on the twenty-first line of Table 6, but CD 5B 03 was used so the following point could be made. The TBUG manual states that both DE and IY must be saved and restored in a keyboard scan routine. The saving and restoring of DE is not necessary if CD 5B 03 is used in place of CD 2B 00.

Try out the D command in a section of the ROM starting at 0100. Using D on T-BUG itself would not be advisable.

Step 7

Another new command, Verify, can be added to the T-BUG repertoire, analogous to the CLOAD? command. The V command verifies without loading machine language programs recorded by the P command. If any byte on tape does not agree with that in memory, the recorder is immediately stopped and an E appears on the screen next to V. The M command and Table 7 will add the V command to T-BUG.

Step 8

This step relocates the T-BUG stack to a RAM stack location employed by the ROM. By changing the contents of three pairs of addresses; 43A1, 43A2; 43A6, 43A7 and 43C2, 43C3 to 88, 42 your machine language programs may now be written using any address from 4851 through the end of memory. To

ADDRESS	CONTENTS
43FE	C3 7D 47
477D	CA 93 43
4780	FE 44
4782	C2 01 44
4785	21 29 44
4788	36 C9
478A	CD 0D 44
478D	06 0F
478F	DD E5
4791	E1
4792	4E
4793	D9
4794	CD 3B 44
4797	D9
4798	71
4799	23
479A	4E
479B	2A 3D 48
479E	71
479F	10 EE
47A1	CD 5B 03
47A4	06 10
47A6	FE 20
47A8	28 E5
47AA	FE 58
47AC	20 F3
47AE	21 29 44
47B1	36 CD
47B3	CD B8 44
47B6	C3 AB 43

Table 6

ADDRESS	CONTENTS
4408	C3 B9 47
467C	C3 C7 47
47B9	16 00
47BB	CA 06 45
47BE	15
47BF	FE 56
47C1	CA 06 45
47C4	C3 0B 44
47C7	5E
47C8	CD 35 02
47CB	73
47CC	5F
47CD	96
47CE	A2
47CF	20 07
47D1	73
47D2	23
47D3	7B
47D4	81
47D5	C3 82 46
47D8	CD F8 01
47DB	18 2F

Table 7

record the customized T-BUG on cassette tape, type:

P 4380 4812 4762 TBUG

and press ENTER. You may find it convenient to record the modified T-BUG several more times on the tape. Before making the final recording, change the contents of address 43DE to 26. The last recording of T-BUG will then have an & for a prompt instead of the usual #. The & prompt indicates the tape needs rewinding before loading T-BUG the next time. ■

DR. HOWE'S SOFTWARE

For the TRS-80 (*)

MACHINE LANGUAGE SOFTWARE

MONITOR #3.....\$39.95
Disassembler; memory displays; memory move, search verify, and modify; read and write object tapes; hexadecimal arithmetic; object code relocater; unload programs for disk; symbolic output tapes; 41-page instruction manual.

MONITOR #4.....\$49.95
Same as Monitor #3 but adds: save and read disk files; direct input and output of disk sectors; send, receive, or talk to another computer via RS-232-C interface; symbolic disassembly on disk.

SMART TERMINAL.....\$49.95
Enables your TRS-80 to be used as a remote terminal to a time-sharing system. Supports lowercase and full range of control keys. *Automatic transmission* between memory and host computer. Much more.

PACKUNPACK.....\$24.95
Increase disk file capacity by 33% with **NO NEW HARDWARE**. Applies only to string data in random files. Ideal for mailing lists, etc.

GAME OF "LIFE".....\$5.95
John Conway's game of "life" shows patterns evolving and changing swiftly before your eyes. A dazzling demonstration program!

BASIC SOFTWARE

MAILING LIST.....\$69.95
Maintains mailing list files of over 1000 names per diskette. Add, delete, change, find name, machine language sort, print file.

SMALL BUSINESS ACCOUNTING.....\$49.95
Based on Dome Bookkeeping Journal #612, keeps track of income, expenditures, and payroll for a small business of up to 16 employees. Daily, monthly, year-to-date summaries.

HOME BUDGET.....\$49.95
Checkbook maintenance combined with records of income and monthly bills. Monthly and year-to-date summaries showing tax deductions.

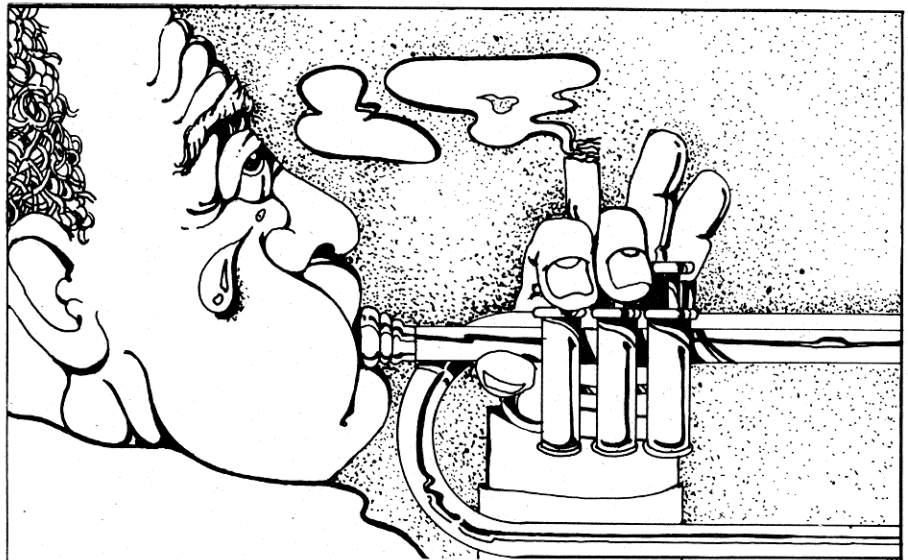
DATABASE MANAGEMENT.....\$29.95
Define files of any description and maintain on cassette or disk. Add, change, delete, find, sort, justify, print, line print, total fields, write.

HOWE SOFTWARE

✓103

14 Lexington Road
New City, New York 10956

(*) TRS-80 is a registered trademark of Tandy corp.



THE TRS-80* BLUES.

Do your TRS 80'S limitations hit a sour note? Our full line of business-oriented software can change that tune.

They're easy to use, modularly designed, and superiorly documented, giving you versatility and sophistication of a higher scale, at a price you'll sing about.

So write us, and we'll send you the score.

SMALL BUSINESS SYSTEMS GROUP

GROTON STREET, DUNSTABLE, MA. 01827 (617) 649-9595 ✓18

*TRS-80 is a registered trade mark of Radio Shack, a division of Tandy Corp.

SMALL SOFTWARE SYSTEM

PRODUCTS FOR THE TRS-80*

SMALL SOFTWARE SYSTEM

MACHINE LANGUAGE GAMES

AIR RAID, BARRICADE or RSL-1: - \$10.00 each, all 3 for \$25.00

AIR RAID: A super shooting gallery; our most popular game. Ground based missile launcher shoots high speed aircraft! Hours of fun!

BARRICADE: "BREAKOUT" for the TRS-80! Break through 5 walls with high-speed ball and keyboard controlled paddle! 96 different options!

RSL-1: Enter patterns with repeating keyboard! Save patterns on tape (4 furnished). Play John Conway's LIFE. - FAST - about 1 second per generation!

ADVENTURE! \$14.95 each, (3 or more, \$12.50 each)

7 versions: 1-Adventureland, 2-Pirate's Adventure, 3-Mission Impossible, 4-Voodoo Castle, 5-The Count, 6-Strange Odyssey, 7-Mystery Fun House.

UTILITIES

RSM-2: MACHINE LANGUAGE MONITOR FOR 16K TRS-80'S - \$26.95

RSM-2D: THREE VERSIONS OF RSM-2 FOR DISK SYSTEMS - 29.95

RSM-2 RELOCATOR: PUT RSM-2/D ANYWHERE IN MEMORY - 9.95

Machine Language monitors with Z-80 disassembler! HEX and ASCII memory dumps; EDIT, MOVE, EXCHANGE, VERIFY, FILL, ZERO, TEST, or SEARCH memory, read/write SYSTEM tapes, enter BREAKPOINTS, PRINT with TRS232 or Centronics, read/write disk sectors directly! RSM-2 tape loads at top of 16K LEVEL I or II; RSM-2D disk includes 3 versions for 16K, 32K and 48K.

DCV-1: CONVERT SYSTEM PROGRAMS TO DISK FILES - \$9.95. Execute Adventure, Air Raid, RSL-1, ESP-1, T-BUG, etc. from disk, even if they interfere with TRSDOS! New version works with TRSDOS 2.3.

BASIC-1P: LEVEL-1 BASIC WITH PRINTING! - \$19.95. Run any LEVEL-I BASIC program on your 16K Level-2. PLUS LPRINT and LLIST with our TRS232 or Centronics. Furnished on tape; can be used from disk.

OTHER PRODUCTS FOR THE TRS-80*

ESP-1: \$29.95. Assembler, Editor, Monitor (8080 mnemonics)

LST-1: 8.00. Listing of Level-1 BASIC with some comments

See your dealer or order direct from Small System Software!
CALIFORNIA residents please include 6% for state sales tax.

MODEL-II TRS-80*

CP/M™ VERSION 2.0 FOR THE MODEL-II - \$170.00. Latest version from Digital Research. Runs both single and double density disks! "Standard" version runs nearly any CP/M software, including Cobol, Fortran, C-Basic, M-Basic, business and accounting packages, etc. Hundreds of programs available!

RSMII: ENHANCED RSM MONITOR FOR THE MODEL-II - \$39.95. Relocatable version of RSM-2D plus screen editor for modifying either memory or disk sectors in both Hex and ASCII, split screen scrolling, and formatted serial or parallel printing. Sold on self-booting disk; directions to save as TRSDOS file.

PROFESSIONAL SOFTWARE

MICROSOFT MACRO ASSEMBLER - \$80.00. Editor, Linking Loader, Editor, Cross Reference utilities. Produces relocatable code! Requires 32K, 1 disk.

MICROSOFT FORTRAN - \$80.00. Fortran Compiler, Editor, Library. Linking Loader forms Fortran, Assembly and Library modules into one program! 32K, 1 disk. SAVE! Order both Macro-Assembler and Fortran for \$150.00.

THE ELECTRIC PENCIL FOR THE TRS-80: TAPE-\$99.95, DISK-\$150.00. Popular video editor for creating and saving text files. Prints formatted copy with right justification, page titling & numbering, etc. Upper case only, or lower case with modification. 16K Level-1 or 2 (tape).

CP/M™ OPERATING SYSTEM FOR THE MODEL-I - \$145.00. The 8080/808 "Software Bus for the Model-1 TRS-80. Includes TRS232 and RS-232-C software, lower-case support, debounce, DCV-2 and other unique utilities. Allows use of many available programs written for CP/M.

PRINTER SUPPORT

TRS232 PRINTER INTERFACE - \$49.95 (+\$2.00 shipping). Assembled and tested printer interface for RS232 or 20-mil current loop printers. Expansion interface not required. Print from level-II BASIC, CP/M, BASIC-1P, ELECTRIC PENCIL, etc. Standard cassette software included.

TRS232 "FORMATTER" SOFTWARE PACKAGE - \$14.95. Adds page and line length control, printer pause, "smart" line termination, etc. to TRS232.

RSM232: Adds RS-232-C capability to RSM-2/D - \$9.95

PEN232: RS-232-C for cassette Electric Pencil - \$9.95

EDT232: TRS232 and RS-232-C for disk/tape EDTASM - 9.95

♦♦CP/M tm Digital Research, Inc. ♦ TRS-80 tm Tandy Corp. ✓30

SMALL SYSTEM SOFTWARE P.O. BOX 366 NEWBURY PARK, CA 91320

SMALL SYSTEM SOFTWARE P.O. BOX 366 NEWBURY PARK, CA 91320

H & E COMPUTRONICS INC.

...**EVERYTHING FOR YOUR TRS-80™**...

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation



**SMALL BUSINESS
SYSTEMS GROUP**

COORDINATED BUSINESS SYSTEMS

- EACH MODULE CAN BE OPERATED INDIVIDUALLY OR AS A COORDINATED SYSTEM.
- TURN-KEY ERROR CATCHING OPERATION FOR BEGINNERS
- FREE 30-DAY TELEPHONE CONSULTATION WITH SBSG
- EACH MODULE CAN BE FORMATTED TO SPAN DATA ON UPTO 4 DISK DRIVES.
- COMPLETE MANUAL AND DOCUMENTATION ACCOMPANY EACH MANUAL
- MINIMUM SYSTEM REQUIREMENTS - 2 DISK DRIVES FOR MODEL I...1-DISK DRIVE FOR MODEL II

ACCOUNTS PAYABLE

The accounts payable system receives data concerning purchases from suppliers and produces checks in payment of outstanding invoices. In addition, it produces cash management reports. This system aids in tight financial control over all cash disbursements of the business. Several reports are available and supply information needed for the analysis of payments, expenses, purchases and cash requirements. All A/P data feeds General Ledger so that data is entered into the system just once. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding many larger systems.

ACCOUNTS RECEIVABLE

The objective of a computerized A/R system is to prepare accurate and timely monthly statements to credit customers. Management can generate information required to control the amount of credit extended and the collection of money owed in order to maximize profitable credit sales while minimizing losses from bad debts. The programs composing this system were developed 5 years ago, especially for small businesses using the Wang Microcomputer. They have been tested in many environments since then. Each module can be used stand alone or can feed General Ledger for a fully integrated system.

PAYROLL

Payroll involves many complex calculations and the production of reports and documents, many of which are required by government agencies. It is an ideal candidate for the computer. With this Payroll system in-house, you can promptly and accurately pay your employees and generate accurate documents/reports to management, employees, and appropriate government agencies concerning earnings, taxes, and other deductions. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES:

- ★ performs all necessary payroll tasks including:
 - file maintenance, pay data entry and verification
 - computation of pay and deduction amounts
 - printing of reports and checks
- ★ can handle salaried and hourly employees
- ★ employees can receive:
 - hourly or salary wage
 - vacation pay
 - holiday pay
 - piecework pay
 - overtime pay

(Continued on next page)

CAPABILITIES

- ★ menu driven; easy to use; full screen prompting and cursor control
- ★ invoice oriented; everything revolves around the invoice; handles new invoice or credit memo or debit memo
- ★ invoice information recorded; invoice #, description, buyer, check register #, invoice date, age date, amount of invoice, discount (in %), freight, tax (\$), total payable
- ★ transaction print and file maintenance procedures insure accuracy
- ★ flexible check calculation procedure; allows checks to be calculated for a set of vendors - or - for specific vendors
- ★ program prints your checks; contiguous computer checks with your company letterhead can be purchased from SBSG
- ★ reports include (samples on back):
 - open item listing/closed item listing - both detail and summary
 - debit memo listing/credit memo listing
 - aging
 - check register report (to give an audit trail of checks printed)
 - vendor listing and vendor activity (activity of the whole year)
- ★ fully linked to GENERAL LEDGER; each invoice can be distributed to as many as five (5) different GL accounts; system automatically posts to cash and A/P accounts

CAPABILITIES

- ★ menu driven; easy to use; full screen prompting and cursor control
- ★ invoice oriented; invoices can be entered before ready for billing, when ready for billing, after billing or after paid
- ★ allows entry of new invoice, credit memo, debit memo, or change/delete invoice
- ★ allows for progress payment
- ★ transaction information includes:
 - type of A/R transaction
 - customer P.O. #
 - description of P.O.
 - billing date
 - general ledger account number
 - invoice amount
 - shipping/transportation charges
 - tax charges
 - payment
 - progress payment information
 - transaction print and file maintenance procedures insure accuracy
- ★ customer statements printed; computer statements with your company letterhead can be purchased from SBSG
- ★ reports include; (samples on back)
 - listing of invoices not yet billed
 - open items (unpaid invoices)
 - closed items (paid invoices)
 - aging
- ★ fully linked to General Ledger; will post to applicable accounts: debits A/R, credits account you specify

(PAYROLL CAPABILITIES CONTINUED)

- ★ employees can be paid using any combination of pay types (except, hourly cannot receive salary & salary cannot receive hourly)
- ★ special non-taxable or taxable lump sums can be paid regularly or one time (bonus, reimbursements, etc)
- ★ health & welfare deductions can be automatically calculated for each employee
- ★ earnings-to-date are accumulated and added to permanent records; taxes are computed and deducted: US income tax, Social Security tax, state income tax, other deductions (regular or one time)
- ★ paychecks are printed; computer checks with your company letterhead can be purchased from SBSG
- ★ calculations are accumulated for; employee pay history, 941A report, W-2 report, insurance report, absentee report
- ★ fully linked to General Ledger. Each employee's payroll information can be distributed to as many as (12) twelve different GL accounts; system automatically posts to cash account.

INVENTORY/CONTROL INVOICING

- OVER 1000 ITEMS ON MODEL I
- OVER 3000 ITEMS ON MODEL II
- LOW STOCK ALARM
- INVOICING DEDUCTS FROM INVENTORY
- COMPLETE INVENTORY REPORTS
- REORDER POINT REPORT
- QUICK ITEM ACCESS

CLIENT BILLING, STOCK CONTROL, DENTAL BILLING, COMMODITIES
Medicare/Medicaid billing also available

MODEL I	\$125 Per Module
	\$495 Complete System
MODEL II	\$225 Per Module
	\$995 Complete System

WE ARE THE ONLY SOFTWARE COMPANY THAT OFFERS A REFUND
WITHIN 30 DAYS ON ALL SOFTWARE (H & E COMPUTRONICS
MONTHLY NEWSMAGAZINE SUBSCRIBERS ONLY). WE DO
CHARGE A \$3 PENALTY TO COVER POSTAGE AND HANDLING.

GENERAL LEDGER

The General Ledger accounting system consolidates financial data from other accounting subsystems (A/R, A/P, Payroll, direct posting) in an accurate and timely manner. Major reports include the Income Statement and Balance Sheet and a "special" report designed by management. The beauty of this General Ledger system is that it is completely user formatted. You "customize" the account numbers, descriptions, and report formats to suit your particular business requirements. These programs were developed 5 years ago for the Wang micro-computer and have been tested in many environments since then. The package has been converted to the TRS-80™ and is now a well documented, on-line, interactive micro-computer system with the capabilities of (or exceeding) many larger systems.

CAPABILITIES

- ★ more than 200 chart of accounts can be handled
- ★ account number structure is user defined and controlled
- ★ more than 1,750 transactions may be entered via:
 - direct posting; done by hand; validated against the account file before acceptance
 - external posting; generated by A/R, A/P, Payroll or any other user source
- ★ data is maintained and reported by:
 - month
 - quarter
 - year
 - previous three quarters
- ★ reports (samples on back) include:
 - trial balances
 - income statement
 - balance sheet
 - special accounts reports and more
- ★ user formats reports with the following designed as you wish:
 - titles
 - headings
 - account numbers
 - descriptions
 - subtotals
 - totals
 - skip lines
 - skip pages
- ★ up to eight levels of totals - fully user designated
- ★ menu driven; easy to use; full screen prompting and cursor control

COMPUTRONICS
MATHEMATICAL APPLICATIONS SERVICE™

Box 149

New City, New York 10956



**24 HOUR
ORDER
LINE**
(914) 425-1535



PLEASE SEND ME:

MODEL I \$125 PER MODULE _____
 \$495 COMPLETE SYSTEM _____
MODEL II \$225 PER MODULE _____
 \$995 COMPLETE SYSTEM _____

CREDIT CARD NUMBER _____ EXP. DATE _____

SIGNATURE _____

NAME _____

ADDRESS _____ STATE _____ ZIP _____

*** ADD \$6/YEAR (CANADA, MEXICO) - ADD \$12/YEAR AIR MAIL - OUTSIDE OF U.S.A., CANADA & MEXICO ***

A simple, but powerful way to incorporate machine code sections in your BASIC programs.

MACROPOKE Monitor

Larry Suter
1643 Warsaw Ave.
Livermore, CA 94550

Here's a somewhat different approach to putting machine-language programs into the Level II TRS-80, using a pair of simple programs that I think you'll find are powerful and convenient tools.

The programs are powerful because they allow you to edit your machine-language routines, unlike other monitors

which are separate programs and actually deprive you of the Level II editor.

You'll find these routines convenient too, because they allow you to incorporate your "machine-language development system" as a small part of larger BASIC programs.

Another very convenient feature of this monitor is that when you CSAVE or CLOAD your BASIC program, you also save or read your machine-language routine. No extra reads or writes are required.

You'll find the bare bones

form of this monitor, together with a sample machine-language routine, in lines 10 to 30 of Listing 1. The key to this monitor is that the machine-language program is contained in BASIC DATA statements.

To load your routine into memory you need to specify AD, the location where you will begin to store your program.

In this example, we start at location 20224 decimal or 4F00 hex. Typing RUN causes the program to read the hex bytes, converts them to decimal and then POKEs them sequentially into memory very quickly. When it finishes loading the program, it reads the XX, which causes it to branch to wherever you want.

As I said, you have full editing control of the monitor.

For example, let's say that when you're proofreading your program, you see that you've left a statement out. Use the editor to insert it into the DATA statement, or use the editing mode to slip a few new instructions in to expand your program. If you want to take out a few bytes, use the Level II editor to delete them.

Listing 1 lets us look at pieces of the bit stream coming in from the cassette recorder. Not a very exciting program, but a reasonable example of how this monitor combines a very fast machine-language routine with a much slower, but easier to write BASIC program.

When the program branches to the main routine at line 100, it POKEs the two-byte starting address of the machine-language

routine into locations 16526 and 16527 of memory. This informs the TRS-80 where our machine-language routine starts (see p. 8/8 of the Level II BASIC Manual for a more complete description of this).

Now we're ready to read from the cassette recorder.

OUT255,4 turns on the cassette recorder. Next the program waits a bit by executing the FOR, NEXT loop. This delay allows the tape recorder to come up to speed.

Then we read data from the cassette port with IN(255). When the input value is greater than 128 we know we're reading data and not a blank tape. Now we're ready to jump to the machine-language routine by executing the USR(0) function.

The Routine

The actual machine-language routine is detailed in Example 1. What it does is read from the cassette input port, mask bit 7 (the active bit of the port), store the value into memory starting at 4B00H (19200 decimal), reset the input flip-flop (see the TRS-80 Microcomputer Technical Reference Handbook for an explanation of this), increment the storage pointer (the HL registers) and loop back to the beginning, until it stores 512 bytes.

Then it returns to the BASIC routine. That's a lot to do in a short amount of time, and that's why we do it in machine language!

Having stored the data, we now use BASIC commands to display the bit stream we just

```

9 REM AD = ADDRESS WHERE WE START TO STORE PROGRAM
10 AD = 20224
13 REM READ THE HEX INSTRUCTIONS FROM THE DATA STATEMENT
14 REM XX MARKS THE END OF THE MACHINE LANGUAGE PROGRAM
15 READ A$:IF A$ = "XX" THEN 100
16 REM
17 REM THIS WILL PUT THE DECIMAL VALUE OF A$ INTO A
18 B$ = LEFT$(A$,1):GOSUB25:A = 16*B$:B$ = RIGHT$(A$,1):GOSUB25:
19 A = A + B
20 REM STORE BYTE AND INCREMENT POINTER. THEN GET MORE.
21 POKE AD,A:AD = AD + 1:GOTO 15
22 REM
23 REM THIS SUB CONVERTS 0-F ASCII TO 0-15 DECIMAL
24 B = ASC(B$) - 48:IF B > 9 THEN B = B - 7
25 RETURN
26 REM
27 REM OUR MACH. LANG. PROG. IS IN THE DATA STATEMENT
28 DATA 21,00,4B,DB,FF,E6,80,D3,FF,77,23,7C,FE,4D,20,F3,C9,XX
29 REM
30 REM LOAD STARTING ADDRESS INTO TRS-80 POINTER
31 POKE 16526,0:POKE 16527,79
32 REM
33 REM START CASSETTE, THEN WAIT A BIT
34 AD = 19200:OUT 255,4:FOR I = 1 TO 200:NEXT
35 REM
36 REM WAIT UNTIL THERE IS DATA THEN USE MACH. LANG. PROG.
37 IF INP(255) < 128 THEN 110 ELSE PRINT USR(0)
38 REM
39 REM DISPLAY DATA ON TV
40 PRINT AD,PEEK(AD):AD = AD + 1:FOR I = 1 TO 20:NEXT:GOTO 120

```

Listing 1: Shows you how to incorporate the monitor (lines 10 to 30) into a BASIC program. This example uses machine language to collect data from the cassette port and then displays it with BASIC.

collected on the screen. As you see, you get 0s with occasional bunches of 128s. The 128s are the pulses from the recorder. (How these highs and lows relate to data bytes is described on page 46 of the TRS-80 Microcomputer Technical Reference Handbook.)

Making changes in the machine-language portion of the program for debugging, fixing or adding more features is just as simple as changing the BASIC part of the program with the Level II editor.

Compare this with other independent monitors which require you to load a long program from tape, make your changes and reload your own BASIC program.

The drawback of this technique is that incorporating the program steps in DATA statements requires about 3.3 bytes of storage per machine-language byte. For most programs, this is more than balanced by the very short length of the raw machine-language monitor, (132 bytes for the monitor in Listing 1) compared with the sizes of other monitors (about 1.5K).

By the way, Example 1 has a subtle bug in it. When you issue the OUT FF command, you not only reset the input flip-flop, which we need to do after each 1 is received, but we also send a 0 in bit 2 to the port. This 0 turns off the cassette motor! A 1 keeps it going.

On the time scale of this routine's execution, the cassette keeps coasting, so we'd never notice it. For longer reads we'd soon find there's a bug.

```
LD HL,4B00H
IN FFH
AND 80H
OUT FFH
LD (HL),A
INC HL
LD A,H
CP 4DH
JR N, F3H
RET
```

Example 1: Assembly language listing of the program that reads in data from the cassette port and stores it in memory location (HL).

```
A IN FFH
AND 80H
JP Z, A
```

```
DATA.....LA,DB,FF,E6,80,CA,TA.....
```

Example 2: Assembly language listing of a simple program loop written to use MACROPOKE.

What coding changes would you put in to fix this bug? They're easy to put in with the editor. Be sure to change the JR,N displacement to incorporate your changes.

MACROPOKE

For the majority of BASIC and machine-language programming, the short and simple monitor we just described should be adequate. In my opinion machine-language routines should be short and used only when necessary, such as when working with fast peripherals.

Unfortunately, you occasionally end up writing long routines with several entry points, jumps or CALLs to subroutines. For those applications, a further extension of the monitor is necessary.

This monitor uses labels for branching, instead of requiring you to specify hex addresses. The monitor resembles a small assembler, inasmuch as you need not worry about absolute addresses when you make changes. Insertions or deletions no longer require meticulous care of subroutine addresses, jump destinations and entry points.

Since this program allows you to POKE good sized machine-language routines anywhere in RAM, I call it MACROPOKE.

To use MACROPOKE you have to follow three straightforward rules. First, to put a label n (where n = 1,2,...,A,B,...,Z, and a few others such as ?, @, =) on a statement, you insert Ln into the DATA statement just before the instruction you want to identify with label n.

The L tells our assembler that

the instruction it just read from the DATA statement is a label. The n tells it which label it is. When the assembler sees an L, it knows it should remember the absolute address of the following byte.

The second rule is employed when making a two-byte JUMP or CALL to the instruction labeled by n. Put Tn after the JP or CALL instruction.

The T tells the assembler to insert the two-byte address of label n after the JP or CALL.

The third rule is used when performing a one-byte relative jump. Insert an Rn after the instruction.

The R tells the assembler to calculate the number of bytes displaced to n and place that value where it found the Rn.

Example 2 shows a section of an assembly language listing, including a jump-on-zero to an absolute address. This routine keeps on looping until an 1 is in-

put in bit 7.

The DATA statement for this, using the Ln and Tn instruction is also shown.

If we desire to use a relative jump-on-zero, (JR Z,A) then we put 28,RA in place of the CA,TA. If we need to insert a few instructions into the loop, we simply use the Level II editor to insert them in the DATA statement. The assembler takes care of the addresses.

Two-Pass System

Listing 2 shows the actual assembler. Stripped down, without REMs and spaces, it's about 450 bytes long. The sample machine-language program contained in the DATA statement waits for data to start coming in from the cassette port and displays it directly on the monitor. You may want to decode it, try it and modify it.

MACROPOKE is a two-pass system. V(42) is the vector where

```
4 REM V WILL CONTAIN ADDRESSES OF LABELED BYTES
5 DIM V(42):CLS:BP=20224:AD=BP
9 REM FIRST PASS ENDS WHEN XX IS READ
10 READ BS:IF BS="XX" THEN 35
19 REM SEE IF WE JUST READ A LABEL. STORE ADDRESS IF WE DID.
20 AS=LEFT$(BS,1):IF AS="L" GOSUB 99:V(N)=AD:GOTO 10
24 REM T INSTRUCTIONS REQUIRE AN EXTRA INCREMENT
25 IF AS="T" THEN AD=AD+1
29 REM INCREMENT ADDRESS POINTER AND LOOP BACK
30 AD=AD+1:GOTO 10
33 REM
34 REM RESET POINTERS FOR SECOND PASS
35 AD=BP:RESTORE
39 REM XX INDICATES END OF DATA
40 READ BS:IF BS="XX" THEN 100 ELSE AS=LEFT$(BS,1)
44 REM CHECK TO SEE IF BYTE IS AN L,T OR R INSTRUCTION
45 IF AS="L" THEN 40 ELSE IF AS="T" THEN 93 ELSE IF AS="R" THEN 96
59 REM DECIMAL VALUE OF BYTE BS GOES INTO A
60 GOSUB 90:A=16-X:AS=RIGHT$(BS,1):GOSUB 90:A=A+X
69 REM STORE BYTE AND GO FOR MORE
70 POKE AD,A:AD=AD+1:GOTO 40
89 REM CONVERT ASCII 0-F TO DECIMAL 0-15
90 X=ASC(AS)-48:IF X>9 THEN X=X-7
91 RETURN
92 REM STORE 2 BYTES INDICATED BY T INSTRUCTION
93 GOSUB 99:GOSUB 94:AD=AD+2:GOTO 40
94 A=INT(V(N)/256):POKE AD+1,A:POKE AD,V(N)-256*A:RETURN
95 REM CALCULATE AND STORE 1 BYTE DISPLACEMENT
96 GOSUB 99:A=V(N)-AD-1:IF A<0 THEN A=256+A
97 GOTO 70
98 REM FIND DECIMAL EQUIVALENT OF LABEL
99 N=ASC(RIGHT$(BS,1))-48:RETURN
100 AD=16526:N=1:GOSUB 94
101 REM YOUR PROGRAM STARTS AT 100
105 OUT 255,4:FOR I=1 TO 200:NEXT X=USR(0):OUT 255,0
998 REM
999 REM CASSETTE READ AND DISPLAY ROUTINE FOLLOWS
1000 DATA L1,21,00,3C,L3,DB,FF,E6,80,CA,T3,LA,DB,FF,E6,80,D3,FF,07,C6,30,
77,23,06,20,L2,10,R2,7C,FE,3F,C2,TA,C9,XX
```

Listing 2: MACROPOKE routine that allows you to use labels, rather than addresses. The bug mentioned in Example 1 is also present in this routine. You'll see it when you run the program. Can you fix it? This time you don't have to worry about addresses.

we store the addresses of the various labels that the assembler encounters. BP is the address where we want to store the first statement of the machine-language routine.

MACROPOKE makes its first pass through the coding in lines 10 to 30. This pass looks for labels. If it finds an Ln statement, it sets V(n) equal to the address of the following instruction.

Having stored the addresses of the various labels, the assembler starts the second pass, lines 35 to 70. This pass converts the hex instructions to machine language and stores them. It also inserts the correct addresses and displacements when it encounters Tn and Rn in-

structions.

This assembler can be used stand-alone or be incorporated into BASIC programs. It allows fully relocatable coding, since all addresses are determined relative to BP, the base pointer.

Debugging coding is easily incorporated into the MACROPOKE. For example, we could scatter throughout our coding CALLS to a subroutine that displays registers on the monitor and waits for a key to be depressed before returning.

Thus, we can single-step through troublesome sections of coding.

The tangled mess of addresses that is created by inserting and removing these CALLS

is automatically taken care of by the assembler. This allows you to concentrate on the actual program logic. Changing the codes is, of course, made easy with the excellent Level II editor.

Entry points to various routines can also be tagged with labels L1, L2... When you run the assembler you get a table of entry points stored in the vector V. When you want to call the machine-language routine starting at, say, L4 you can use, for example:

N = 4: AD = 16526: GOSUB 94: N = USR(0)

This loads the address of the entry point 4 into the appropriate TRS-80 pointer and CALLS the subroutine.

If you're doing fancy programming using tables, you can label the start of a table with Ln and load the addresses of the tables into the IX or IY registers (or, for that matter, the BC, DE, HL registers) using the appropriate 16-bit load immediate instructions followed by Tn.

I'd like to reiterate that, for most programs, this MACROPOKE is probably overkill. Usually the simple routine described in the first section is adequate. Try to do as much as possible in BASIC, using the machine language only when you really need the speed, such as when dealing with peripherals like the cassette port or the television. ■

FOR TRS-80

ATTENTION INVESTORS!

COMMODITY AND STOCK
MARKET ANALYSIS
SOFTWARE

THE ANALYST
Calculates Wilder Indicators for DMI, RSI, Parabolic/Time Price Systems. Eliminates tedious calculations. **\$49.**

THE OSCILLATOR
Filters historical data and locates profitable oscillators. Provides market entry/exit points. Has simulator mode. **\$49.**

FOR LEVEL II 16K OR 32K DISK

- ✓ User oriented...just load program and go.
- ✓ Market tested
- ✓ Use commercial data files or make your own.
- ✓ Graphic capabilities
- ✓ Printer options
- ✓ Clear and complete documentation
- ✓ Monitor numerous markets in just minutes per day

MANAGEMENT SERVICES
2901 CLENDENEN LANE ✓213
LONGVIEW, TX 75601
TEX. RES. ADD 5% SALES TAX

THREE OUTSTANDING PROGRAMS

PARSECTOR V THE ULTIMATE SPACE WAR \$19.95
Two opponents must navigate powerful mother ships through the galaxy and capture parsectors. Launch fleet battle craft: flyers, cruisers, and bases. Fire high powered energy beams or deadly short range weapon spreads. To win you must conquer the galaxy or destroy your opponent's mother ship.
SPECIAL FEATURES: Unique split screen gives each player a private video display. Action Sounds and Graphics: explosions, weapon releases, launches, and more. Variable galaxy size. Play another person or the computer opponent at 3 difficulty levels. **LAUNCH A COMPLETE SPACE FORCE IN MINUTES!**

ANTS!!! A STIMULATING ACTION GAME \$14.95
Two colonies of ants are at war. Opposing queen ants produce four types of offspring: workers, soldiers, guards, and drones. The challenging strategy is to produce ants in the proper sequence to sting the enemy queen or overrun it's nest.
SPECIAL FEATURES: Full screen action with SOUND. Hundreds of ants battle with machine language speed. 3 game variations. Play another person or the computer opponent at 4 difficulty levels.

NAME THAT STATE QUIZ EDUCATIONAL \$14.95
A fascinating way to learn about our 50 states. It teaches the state shapes, names, capitals, populations, areas, and geographic regions. Three types of quizzes: true & false, multiple choice, and fill in the blank. **SPECIAL FEATURES:** Action Sounds, rewarding tones and harassment buzzers. Continuous score. Easy to use. ✓211

TRS-80 L2 16K required. For sound you must hook up an inexpensive speaker-amp system to cassette pin. For program cassette & instructions send CHECK or MONEY ORDER.

SYNERGISTIC SOLAR INC., PO Box 560595, MIAMI FL 33156

We're convinced that the problem with learning Z-80 Assembly language is the direct result of a lack of good source programs to serve as study guides. Remember when you were learning Basic? Every time you encountered a problem, there were dozens of examples to help you work it out. Not so with assembly language. Combined with the fact that there are more and more intricate concepts to understand, things have been rough going for the persons desiring to master this excellent language. We believe that the general availability of some programs — especially for the TRS-80 — will aid to better all who choose to investigate this fascinating field, ideally providing faster and more competent programs down the road! For this reason, we have been encouraging authors to make the EDTASM source code available, at least as an option. And, we're proud to say, we've been successful!

**Z-80 Source Code from
THE ALTERNATE SOURCE**

Each source listing listed below is a valuable tutorial in itself! All programs are designed for the TRS-80 and include a Z-80 source file!

- **DVR** — a Driver package that adds several features to the TRS-80 including: screen echo to printer, repeating key, lower case driver and more! Level II or DOS. Cassette: **\$15.95**; diskette: **\$18.95**. Works with NEWDOS also!
- **KEEPIIT** — Level II only! Preserves your program from any execution point. Excellent for debugging and saving current program status. Cassette only: **\$9.95**.
- **COPYDISK** — a program which allows copying of several DOS files at once with no system diskette! Complete Disk I/O routines! Great for FIFTEEN machine language subroutines that are utilized! If you're already a Microsketch owner, purchase the two support packages and the source codes for the fifteen machine language utilities for only **\$19.85 total!** Owners of DVR and COPYDISK may return original media and purchase the source codes for the difference in price!
- **MICROSKETCH III package** — Microsketch, Microscreen and Screen Save Utility. These three programs (on 3 tapes) make graphics as easy as 1-2-3! All 3 programs sell for **\$23.85**. Included FREE are the source codes for FIFTEEN machine language subroutines that are utilized! If you're already a Microsketch owner, purchase the two support packages and the source codes for the fifteen machine language utilities for only **\$19.85 total!** Owners of DVR and COPYDISK may return original media and purchase the source codes for the difference in price!

Mail your order to: **TAS SOURCE, 1806 Ada Street, Lansing, MI 48910**. VISA and Master Charge accepted by phone 517/487-3358. Include 50¢ per program for First Class Mail. **More to come!** ✓138

GET Paid for using your Computer

FUN! Easy

RUSH COUPON FOR FREE FACTS

GREAT SPARE TIME

Send today to DAR- E3
3110 Fulton Ave., Sacramento CA 95821 ✓134

CASH

NAME
STREET
CITY
STATE ZIP

NOTICE

NEW PRODUCT WITH \$30 REBATE

Direct from factory the world's finest custom all wood CF-80 series furniture for the built-in TRS-80, we are proud to announce a new low price CF-80 series unit, made from formica, for only \$129.95. Further, all orders received prior to April 15, 1980, will receive an unbelievable \$30 rebate. That's right, for \$99.95 you will receive a custom corner desk console that provides total built-in capability of TRS-80 keyboard, interface, monitor, and cassette. Absolutely no cables visible. To be eligible for rebate, all orders must be by check or money. No COD's or charge cards.

SPECIAL NOTE: Our high quality, real wood furniture is now available thru VISA, or Master Charge, or our new low price series without rebate.

ORDER NOW
24 HOUR
PH 408-946-1265 ✓146

AVS

AUDIO-VIDEO SYSTEMS
2485 Autumnval Ave.
San Jose, CA 95132

TRS-80 CASSETTE SOFTWARE SOL-20

Home and Light Business Applications

These popular, professionally developed applications are low-priced. Guaranteed performance! Detailed booklet included.

- BUDGET & INVESTMENT \$17.95
- BUDGET & CHECKING \$14.95
- HOME INFO RETRIEVAL \$11.95
- MATH (ages 5 and up) \$ 7.95
- STOCK PORTFOLIO \$18.95
- AUTOMOBILE \$12.95
- MASTERMIND game \$10.95
- MONTE CARLO game \$ 7.95
- and others from \$ 4.95

Send order, or \$1.00 for descriptive catalogue (free with order) to: ✓116

NEWBY SOFTWARE DEVELOPMENT CO.
299 DAWLISH AVE. TORONTO, CANADA M4N 1J6

Everybody's making money selling microcomputers. Somebody's going to make money servicing them.

**New NRI Home Study Course Shows You How to Make Money Servicing, Repairing,
and Programming Personal and Small Business Computers**

Seems like every time you turn around, somebody comes along with a new computer for home or business use. And they're being gobbled up to handle things like payrolls, billing, inventory, and other jobs for businesses of every size...to perform household functions like budgeting, environmental systems control, indexing recipes, and more.

Growing Demand for Computer Technicians... Learn in Your Spare Time

Even before the microprocessor burst upon the scene, the U.S. Department of Labor forecast over a 100% increase in job openings for the decade through 1985. Most of them *new* jobs created by the expanding world of the computer. NRI can train you at home to service both microcomputers and their big brothers. Train you at your convenience, with clearly written "bite-size" lessons that you do evenings or weekends without quitting your present job.

Assemble Your Own Microcomputer

NRI training includes practical experience. You start with meaningful experiments building and studying circuits on the NRI Discovery Lab®. Then you build your own test instruments like a transistorized volt-ohm meter, CMOS digital frequency counter...equipment you learn on, use later in your work.

And you build your own microcomputer, the only one designed for learning. It looks and operates like the finest of its kind, actually does more than many commercial units. But NRI engineers have designed components and planned assembly so it demonstrates important principles, gives you working experience in detecting and correcting problems. It's the



kind of "hands-on" training you need to repair and service units now on the market.

Mail Coupon for Free Catalog No Salesman Will Call

Send today for our 100-page, full-color catalog. It describes NRI's new Microcomputer Technology course in detail, shows all equipment, kits, and lesson plans. And it also tells about other NRI courses... Complete Communications with 2-meter

transceiver...TV/Audio/Video Systems Servicing with training on the only designed-for-learning 25" diagonal color TV with state-of-the-art computer programming. With more than a million students since 1914, NRI knows how to give you the most in home training for new opportunity. If coupon has been removed, write to NRI Schools, 3939 Wisconsin Ave., Washington, D.C. 20016.

RUSH FOR FREE CATALOG



NRI Schools

McGraw-Hill Continuing
Education Center
3939 Wisconsin Avenue
Washington, D.C. 20016

Please check for one free catalog only.

NO SALESMAN WILL CALL



All career courses
approved under GI Bill.
☐ Check for details.

- ☐ Computer Electronics Including Microcomputers
- ☐ TV/Audio/Video Systems Servicing
- ☐ Complete Communications Electronics with CB • FCC Licenses • Aircraft, Mobile, Marine Electronics
- ☐ CB Specialists Course
- ☐ Amateur Radio • Basic and Advanced

- ☐ Digital Electronics • Electronic Technology • Basic Electronics
- ☐ Small Engine Repair
- ☐ Electrical Appliance Servicing
- ☐ Automotive Mechanics
- ☐ Auto Air Conditioning
- ☐ Air Conditioning, Refrigeration, & Heating Including Solar Technology

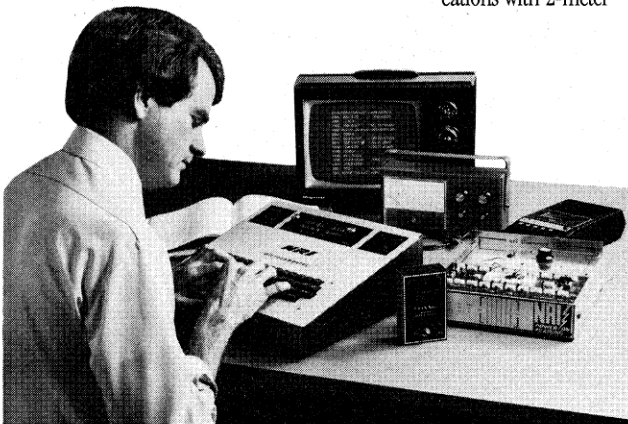
Name _____ (Please Print) _____ Age _____

Street _____

City/State/Zip _____

Accredited by the Accrediting Commission of the National Home Study Council

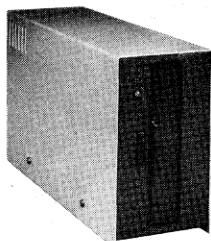
179-040



ComputerCity

Mail Order Division

Formerly the CPU Shop



Disk Drives for TRS-80*

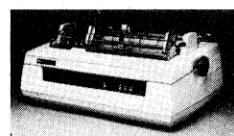
	Reg.	Our
CCI-100™ 40 Track	\$399	\$345
CCI-200™ 77 Track	\$675	\$549
CCI-800™ 8" Drive (Model II)	\$895	\$795

TRS-80* Systems

	Reg.	Our
TRS-80* 16K Level II w/keypad	\$849	\$749
TRS-80* Expansion Interface	\$299	\$279
Cat Modem—Originate and answer. Same as Radio Shack Telephone Interface II	\$199	\$189

SAVE EVEN MORE—CALL FOR COMPLETE SYSTEM PRICES

Printers for TRS-80*



NEC Spinwriter – letter quality high speed printer with TRS-80* interface software		
	Reg. Price	Our Price
	\$2745	\$2479
with Tractor		
779 Centronics Tractor Feed	\$1598	\$ 995
730 Centronics Friction and Pin	\$ 995	\$ 899
PI Centronics Printer	\$ 499	\$ 379
Paper Tiger (IP440) with graphics option	\$1195	\$1155
TI-810 Upper and lower case, parallel and serial, paper tray, and TRS-80* Interface software.	\$2065	\$1829
MPI Inflation Fighter	\$ 795	\$ 749
Sanders 12/7 Typographic Printer	\$3994	\$3899



apple computer

\$1195

Call for Special Accessory Prices

High Technology Mail List (Apple) \$ 40 \$ 35



Z80 based, dual 8" single-sided double density floppies.

32K System
64K System

Reg.
\$4500
\$4960
Call for price

Prices in this ad are for prepaid orders. Slightly higher prices prevail for other than prepaid orders, i.e., C.O.D., credit cards, etc.

Freight collect, F.O.B. Charlestown

ComputerCity

175 Main Street, Dept. M-4, Charlestown, MA 02129

Hours 10AM-6PM (EST) Mon.-Fri. (Sat. till 5) • For detailed information, call 617/242/3350

Massachusetts Residents add 5% Sales Tax • TM CCI-100, -189, -200 & -800 are ComputerCity, Inc. trademarks. TRS-80* is a trademark of the Radio Shack Division of Tandy Corporation † Requires Radio Shack TRSDOS* Prices subject to change without notice. Franchise and Dealer Inquiries Invited

Retail Store / Charlestown, MA • Framingham, MA • Hanover, MA • Burlington, MA
Locations / Manchester, NH • Providence, RI

16 K Memory Upgrade Kits

Add \$2.50 for jumpers and programming instructions

Operating Systems for TRS-80*

	35 Track		40 Track		77 Track	
	Reg.	Our	Reg.	Our	Reg.	Our
NEWDOS by Apparatus†	\$ 49	\$ 44	\$ 55	\$ 50		
NEWDOS Plus	\$ 99	\$ 79	\$110	\$ 89	\$150	\$100

	Reg.	Our
CP/M for TRS-80* Model I, Zenith	\$150	\$145
TRS-80* Model II, ALTOS	\$250	\$170
Manual only		\$ 25

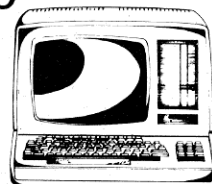
ComputerCity™ Patchpak #4 by Percom Data \$9.95 \$ 8.95
Patches and enhances TRSDOS for 40 track and 77 track drives.
Diskettes 5 1/2" Box of 10 Call for quantity discounts \$ 26.49

Business Software for the TRS-80* by CSA

	MODEL I		MODEL II	
	Reg.	Our	Reg.	Our
General Ledger	\$125	\$97	\$225	\$199
Accounts Payable	\$125	\$97	\$225	\$199
Accounts Receivable	\$125	\$97	\$225	\$199
Inventory	\$125	\$97	\$225	\$199
Mailing List Name and Address	\$129	\$97	\$225	\$199
Complete Computer Checkout Program	\$ 29	\$26		
Spooler by CSA—				
Prints while doing data entry	\$ 29.95	\$ 24.95		

ZENITH (Heath) WH89

The all-in-one computer. Floppy disk storage. Smart video terminal. Two Z80 microprocessors. Complete with 16K RAM expandable to 48K.
CCI™-189 Add-on drives for WH89 \$ 495 Call for price



MATTEL INTELLIVISION

Call for Special Introductory Prices

ATARI® 400 AND 800
PET

Call for Prices

TO ORDER CALL TOLL FREE 1-800-343-6522
TWX: 710-348-1796 Massachusetts Residents call 617/242-3350



Travel around a lot? Use this program to keep all your arrangements under control.

Itinerary

Ben Gorsky
2449 Derbyshire Rd.
Cleveland OH 44106

My wife and I travel a fair amount, and, generally, we make all of our own reservations. For anything but the simplest trip this usually results in reams of paper covered with handwriting, each dealing with some aspect of the trip.

As plans evolve they often change, so some sheets are discarded or the writing crossed out. This can be confusing, and I thought our TRS-80 could, more simply, keep track of trip items

and print an itinerary.

Two Records

Flights, hotels, car rentals and miscellaneous types of reservations are kept on one record. The program also keeps a second payment record.

Items can be added or deleted to either list, and with a line printer a final itinerary can be produced.

The list of variables (Table 1) shows that for each type of reservation, there is another entry that indicates the number of such reservations stored. Other items are subscripted variables.

Most of the variable names make their meaning obvious.

However, since Level II BASIC reads only the first two characters of any variable, some strange entries creep in.

Furthermore, one cannot use reserved words in any variable. Note that the other category has only one item. This permits the storage of a string telling everything about a particular reservation.

Statement 10 does the little housekeeping that is required—establishing some string space and defining some variables as integers and others as strings.

Each letter of the word itinerary is printed with an "at" statement keyed to the variable I, incremented 66 after each letter is printed. This causes the word to show up on a diagonal.

The real program begins with the menu screen at line 100. Statements 150 through 180 acquire data previously stored on tape. For each category, the machine first gets the number of items in the category, then the list of items for each reservation.

Lines 1500-1560 will output the data in an identical format.

Lines 200-330 manipulate flight reservations. This part of the program will be described in detail, as it is the prototype for each of the other reservation modules.

Manipulating Flights

If NFT, the number of flights is zero, a statement is printed on the screen, and the program goes to 230. If NFT is greater than zero, then the flight reservations are displayed. Each has

three lines. The first gives the date, airline, departure city and time. The second has flight number, arrival city and time, while the third is for any remarks.

You can then type "add", "delete" or "leave". If you choose the latter, the program returns to the menu screen.

If you select "add", then the program continues with 240, where you can enter a number to show where you want a flight to go. For example, if you have a list of three flights, and you want the new one to go between two and three, then you would enter "3".

Since three is not greater than the current number of flights, the program continues with 260, where each item is shuffled up one index number. In this case all of the data for flight number three would be re-indexed for flight number four. Then with lines 270 through 305 you enter the data for the new flight number three.

If in line 240 you entered a number greater than the current number of flights, it would be added to the end of the list. The program would skip the shuffling and go directly to statement 270.

At 320 you can enter the number of a flight to be deleted and the index is juggled.

After any change the program returns to 210 to display the current flight reservation data stored. You get back to the menu screen by typing "leave" rather than "add" or "delete."

The remaining sections of the program follow essentially the

NFT	Number of Flights
FDATE(I)	Date of Ith Flight
ALN(I)	Airline
DPCIT (I)	Departure city
DEPTM(I)	Departure time
NM(I)	Flight number
ACIT(I)	Arrival City
ATM(I)	Arrival Time
FCOM(I)	Comments for Flight
NHOT	Number of Hotels
ADAT(I)	Arrival date at Ith Hotel
HOTNAM(I)	Name
DR(I)	Address
DDAT(I)	Departure date
NO	Number of other reservations
OT(I)	Data for other reservations
NACT	Number of accounting items
WHO(I)	Name of party to pay for Ith item
DATDUE(I)	Date payment due
STSNT(I)	Date payment sent
DOLDEP(I)	Amount of payment
NCAR	Number of Rental cars
RSNM(I)	Reservation Number for Ith reservation
AGNCY(I)	Agency for
PDAT(I)	Pick-up date
PLC(I)	Pick-up location
RDAT(I)	Return date
RLC(I)	Return location
TRPNM	Name or title for entire trip

Table 1: List of Variables

same format for the various types of reservations or information. Hotel data manipulations begin at 400, other reservations at 600, car rentals at 800 and payments at 1000.

The lineprinter routine begins at 1200. I use an old model 15 Teletype Baudot code printer, so many innovative printer control functions are not included in the output routine. The printer section of the program is straightforward. Each type of reservation is printed following a heading with tabs to keep things neat.

The Hotel Address

The hotel section does have one tricky part. The address is stored as a single string with slash marks (/) between the lines. At the end of line 1280 a variable A is set equal to the en-

tire address.

In 1290 a loop looks at each character of the string until a slash is found. If no slash is identified, the program will continue at 1310 by printing the variable A.

If a slash is found, then, in 1300, a new variable F gets that portion of A to the left of the slash—that is, the first line of the address. F is then printed.

A is reduced to what remains to the right of that slash, and the program returns to 1290 to look for another slash.

Aside from that one twist, the program prints out variables in an organized fashion.

Note that the program has no end. After each function is accomplished the program returns to the menu. Whenever you are done, you can break out of the program manually. ■

Program Listing: Itinerary.

```
10 CLEAR 2000:DEFINT I,N,K:DEFSTR F,A,D,Z,H,O,P,W,R,T
20 CLS:PRINTCHR$(23):I=66:FOR J=1 TO 9:READ W:PRINT "I:1+66:PRINT
TBI:BY BEN GORSKY":FOR I=1 TO 5000:NEXT:DISPLAYS PROGRAM NAME AND BY LINE
30 DATA I,T,I,N,E,R,A,Y
100 CLS:PRINT"YOU CAN CHOOSE ANY OF THESE FUNCTIONS":PRINTTAB(5)"1 INPUT RESERV
ATION DATA FROM TAPE":PRINTTAB(5)"2 FLIGHT DATA":PRINTTAB(5)"3 HOTEL DATA
"PRINTTAB(5)"4 OTHER RESERVATIONS
110 PRINTTAB(5)"5 CAR RENTALS":PRINTTAB(5)"6 DEPOSITS AND PAYMENTS":PRINTTAB(5)
"7 PRINT ITINERARY":PRINTTAB(5)"8 RECORD DATA ON TAPE"
120 INPUT "ENTER NUMBER CORRESPONDING TO CHOICE":K:ON K GOTO 150,200,400,600,800,
1000,1200,1500:100-120 GIVE MENU SCREEN AND GET CHOICE
150 "INPUT DATA FROM TAPE
160 CLS:INPUT"WHEN RECORDER READY TO PROVIDE DATA":Z:INPUT#-1,NFT,NH
OT,NO,NACT,NCAR:FOR I=1 TO NFT:INPUT#-1,FDATE(I),ALN(I),DPCIT(I),DEPTM(I),N
M(I),ACIT(I),ATM(I),FCOM(I):NEXT
170 FOR I=1 TO NHOT:INPUT#-1,ADAT(I),HOTNAM(I),DR(I),DDAT(I):NEXT:FOR I=1 TO NO:
INPUT#-1,OT(I):NEXT:FOR I=1 TO NACT:INPUT#-1,WHO(I),PLC(I),DTSNT(I),DOLD
EP(I):NEXT
180 FOR I=1 TO NCAR:INPUT#-1,RSNM(I),AGNCY(I),PDAT(I),PLC(I),RDAT(I),RETL(I):NE
XT:GOTO 100
200 "FLIGHT DATA MANIPULATIONS
210 CLS:IF NFT=0 THEN PRINT "NO FLIGHTS LISTED":PRINT:GOTO 230
220 PRINTTAB(26)"FLIGHTS":FOR I=1 TO NFT:PRINT I;" ";FDATE(I):PRINTTAB(5) ALN(I)
,"DEP ";DPCIT(I);" " AT "DEPTM(I):PRINTTAB(5) " ";NM(I),"ARV ";ACIT(I);" " AT
,"ATM(I):PRINTTAB(5) FCOM(I):PRINT:NEXT:DISPLAYS FILE OF FLIGHT DATA
230 PRINT"YOU CAN ADD OR DELETE FLIGHTS OR LEAVE LISTING ALONE":INPUT "TYPE 'AD
D' OR 'DELETE' OR 'LEAVE' AND HIT ENTER":Z:IF Z="ADD" THEN 240 ELSE IF Z="D
ELETE" THEN 320 ELSE IF Z="LEAVE" THEN 100 ELSE 230
240 INPUT "TO ADD A FLIGHT BETWEEN 2 EXISTING FLIGHTS ENTER THE NUMBER FOR THE N
EW FLIGHT IN SEQUENCE TO ADD A FLIGHT AT THE END ENTER NEXT NUMBER IN SEQUE
NCE":K
250 IF K=NFT THEN NFT=NFT+1:K=NFT:GOTO 270:"ADDS FLIGHT AT END
260 NFT=NFT+1:FOR I=NFT-1 TO K STEP -1:FDATE(I+1)=FDATE(I):ALN(I+1)=ALN(I):DPCIT
(I+1)=DPCIT(I):DEPTM(I+1)=DEPTM(I):NM(I+1)=NM(I):ACIT(I+1)=ACIT(I):ATM(I+1)
=ATM(I):FCOM(I+1)=FCOM(I):NEXT
270 INPUT "ENTER DATE OF FLIGHT":FDATE(K)
275 INPUT "ENTER AIRLINE NAME":ALN(K)
280 INPUT "ENTER FLIGHT NUMBER":NM(K)
285 INPUT "ENTER DEPARTURE CITY":DPCIT(K)
290 INPUT "ENTER DEPARTURE TIME":DEPTM(K)
```

```
295 INPUT "ENTER ARRIVAL CITY":ACIT(K)
300 INPUT "ENTER ARRIVAL TIME":ATM(K)
305 INPUT "ENTER ANY COMMENTS":FCOM(K)
310 GOTO 210
320 INPUT "ENTER THE NUMBER FOR FLIGHT TO BE DELETED":J:NFT=NFT-1:FOR I=J TO NFT
:FDAT(I)=FDAT(I+1):ALN(I)=ALN(I+1):DPCIT(I)=DPCIT(I+1):DEPTM(I)=DEPTM(I+1)
:NM(I)=NM(I+1):ACIT(I)=ACIT(I+1):FCOM(I)=FCOM(I+1):NEXT:GOTO 210
330 ATM(I)=ATM(I+1):FCOM(I)=FCOM(I+1):NEXT:GOTO 210
400 "HOTEL DATA MANIPULATIONS
410 CLS:IF NHOT=0 THEN PRINT "NO HOTELS LISTED":PRINT:GOTO 430
420 PRINTTAB(25)"HOTELS":PRINT:FOR I=1 TO NHOT:PRINT I;" ";HOTNAM(I),"ARRIVE ";
ADAT(I):PRINT,"DEPART ";DDAT(I):NEXT
430 PRINT"YOU CAN ADD OR DELETE HOTELS OR LEAVE LIST ALONE":INPUT "TYPE 'ADD' O
R 'DELETE' OR 'LEAVE'":Z:IF Z="ADD" THEN 440 ELSE IF Z="DELETE" THEN 550 EL
SE IF Z="LEAVE" THEN 100 ELSE 430
440 INPUT "TO ADD A HOTEL BETWEEN TWO IN LIST ENTER NUMBER NEW HOTEL SHOULD HAVE
. TO ADD A HOTEL AT END ENTER NEXT NUMBER IN SEQUENCE":K:IFK>NHOT THEN NHOT
=NHOT+1:GOTO 460
450 NHOT=NHOT+1:FOR I=NHOT-1 TO K STEP -1:HOTNAM(I+1)=HOTNAM(I):ADAT(I+1)=ADAT(I)
:DDAT(I+1)=DDAT(I):DR(I+1)=DR(I):NEXT
460 INPUT "ENTER NAME OF HOTEL":HOTNAM(K)
470 INPUT "ENTER ADDRESS OF HOTEL, PUT '/' BETWEEN LINES OF ADDRESS":DR(K)
480 INPUT "ENTER ARRIVAL DATE":ADAT(K)
490 INPUT "ENTER DEPARTURE DATE":DDAT(K):GOTO 410
500 INPUT "ENTER NUMBER OF HOTEL TO BE DELETED":K
510 FOR I=K TO NHOT:HOTNAM(I)=HOTNAM(I+1):DR(I)=DR(I+1):ADAT(I)=ADAT(I+1):DDAT(I)
=DDAT(I+1):NEXT:NHOT=NHOT-1:GOTO 410
600 "OTHER RESERVATION MANIPULATIONS
610 CLS:IF NO=0 THEN PRINT "NO OTHER RESERVATIONS LISTED":GOTO 630
620 FOR I=1 TO NO:PRINT I;" ";OTH(I):PRINT:NEXT
630 PRINT"YOU CAN ADD OR DELETE RESERVATIONS OR LEAVE LIST ALONE":INPUT"ENTER
ADD' OR 'DELETE' OR 'LEAVE'":Z:IF Z="ADD" THEN 640 ELSE IF Z="DELETE" THEN
670 ELSE IF Z="LEAVE" THEN 100
640 NO=NO+1:INPUT"ENTER RESERVATION INFORMATION":OTH(NO):GOTO 610
670 INPUT "ENTER NUMBER OF ITEM TO BE DELETED":K:NO=NO-1:FOR I=K TO NO:OTH(I)=OT
H(I+1):NEXT:GOTO 610
800 "CAR RENTAL DATA MANIPULATIONS
810 CLS:IF NCAR=0 THEN PRINT"NO CAR RENTALS":PRINT:GOTO 830
820 FOR I=1 TO NCAR:PRINT I;" ";AGNCY(I),PDAT(I),PLC(I):PRINTTAB(4)RSNM(I),RDAT
(I),RETL(I):NEXT
830 INPUT "ENTER 'ADD' 'DELETE' OR 'LEAVE' TO MODIFY OR MAINTAIN LIST":Z:IF Z="A
DD" THEN 840 ELSE IF Z="DELETE" THEN 950 ELSE IF Z="LEAVE" THEN 100 ELSE 83
0
840 INPUT "TO ADD A RESERVATION BETWEEN TWO EXISTING ONES ENTER THE NUMBER FOR T
HE NEW RESERVATION. TO ADD AT END OF LIST, ENTER NEXT NUMBER IN SEQUENCE."
:K
850 IF K=NCAR THEN NCAR=NCAR+1:K=NCAR:GOTO 870
860 NCAR=NCAR+1:FOR I=NCAR TO K STEP -1:RSNM(I+1)=RSNM(I):AGNCY(I+1)=AGNCY(I):PD
AT(I+1)=PDAT(I):PLC(I+1)=PLC(I):RDAT(I+1)=RDAT(I):RETL(I+1)=RETL(I):NEXT
870 INPUT "ENTER AGENCY NAME":AGNCY(K)
880 INPUT "ENTER RESERVATION NUMBER":RSNM(K)
890 INPUT "ENTER PICK-UP DATE":PDAT(K)
900 INPUT "ENTER PICK-UP LOCATION":PLC(K)
910 INPUT "ENTER RETURN DATE":RDAT(K)
920 INPUT "ENTER RETURN LOCATION":RETL(K):GOTO 810
950 INPUT "ENTER NUMBER TO BE DELETED":J:NCAR=NCAR-1:FOR I=J TO NCAR:RSNM(I)=RS
NM(I+1):AGNCY(I)=AGNCY(I+1):PDAT(I)=PDAT(I+1):PLC(I)=PLC(I+1):RDAT(I)=RDAT(I)
:RETL(I)=RETL(I+1):NEXT
960 GOTO 810
1000 "PAYMENT DATA MANIPULATIONS
1010 CLS:IF NACT=0 THEN PRINT"NO PAYMENT ITEMS LISTED":GOTO 1030
1020 PRINT "AMOUNT", "DATE DUE":FOR I=1 TO NACT:PRINT I;" ";WHO(I),DO
LDEP(I),DATDUE(I),DTSNT(I):NEXT
1030 INPUT "ENTER 'ADD' 'DELETE' OR 'LEAVE' TO MODIFY OR MAINTAIN LIST":Z:IF Z="
ADD" THEN 1040 ELSE IF Z="DELETE" THEN 1100 ELSE IF Z="LEAVE" THEN 100 ELSE
1030
1040 NACT=NACT+1
1050 INPUT "ENTER NAME OF AGENCY REQUIRING PAYMENT":WHO(NACT)
1060 INPUT "ENTER AMOUNT DUE":DOLDEP(NACT)
1070 INPUT "ENTER DATE DUE":DATDUE(NACT)
1080 INPUT "ENTER DATE SENT":DTSNT(NACT):GOTO 1010
1100 INPUT "ENTER NUMBER TO BE DELETED":J:NACT=NACT-1:FOR I=J TO NACT:WHO(I)=WHO
(I+1):DOLDEP(I)=DOLDEP(I+1):DATDUE(I)=DATDUE(I+1):DTSNT(I)=DTSNT(I+1):GOTO
1010
1200 CLS:"PRINT ITINERARY
1210 INPUT "ENTER TITLE FOR ITINERARY":TRPNM
1220 INPUT "HIT 'ENTER' WHEN LINEPRINTER IS READY":Z:LPRINTSTRINGS(4,13)
1230 LPRINTSTRINGS(69,"X"):LPRINT:PRINTTAB((72-LEN(TRPNM))/2)TRPNM:LPRINT:LPRIN
TSTRINGS(69,"X"):LPRINT:LPRINT:PRINT
1240 LPRINTTAB(25)"F L I G H T S":LPRINT
1250 FOR I=1 TO NFT:LPRINT FDATE(I):TAB(20)ALN(I):TAB(26)"DEP ";DPCIT(I):TAB(50)
"AT ";DEPTM(I):LPRINTTAB(20)" ";NM(I):TAB(26)"ARV ";ACIT(I):TAB(50)"AT ";AT
M(I):LPRINTTAB(20)FCOM(I):LPRINT:NEXT
1260
1270 LPRINT:LPRINT:PRINTTAB(25)"H O T E L S":LPRINT
1280 FOR I=1 TO NHOT:LPRINT HOTNAM(I):TAB(20)"ARV ";ADAT(I):TAB(40)"DEP ";DDAT(I)
:TAB(20)DR(I):LPRINT:NEXT
1290 FOR J=1 TO LEN(A):IF MID$(A,J,1)<>" " THEN NEXT:GOTO 1310
1300 F=LEFT$(A,J-1):LPRINT F:A=RIGHT$(A,LEN(A)-J):GOTO 1290
1310 LPRINT A:LPRINT:NEXT:LPRINT:PRINT
1320 LPRINTTAB(15)"C A R R E N T A L S":LPRINT
1330 FOR I=1 TO NCAR:LPRINT AGNCY(I):TAB(15)"PICK-UP ";PDAT(I):"AT ";PLC(I):LPR
INT RSNM(I):TAB(15)"RETURN ";RDAT(I):"AT ";RETL(I):LPRINT:NEXT:LPRINT:LPR
INT
1340 LPRINTTAB(25)"O T H E R":LPRINT
1350 FOR I=1 TO NO:LPRINT OT(I):LPRINT:NEXT
1360 LPRINT:LPRINT:GOTO 100
1500 "OUTPUT TO TAPE
1510 CLS:INPUT"WHEN RECORDER IS READY TO ACCEPT DATA":Z
1520 PRINT#-1,NFT,NHOT,NO,NACT,NCAR:FOR I=1 TO NFT:PRINT#-1,FDATE(I),ALN(I),DPCIT
(I),DEPTM(I),NM(I),ACIT(I),ATM(I),FCOM(I):NEXT
1530 FOR I=1 TO NHOT:PRINT#-1,ADAT(I),HOTNAM(I),DR(I),DDAT(I):NEXT
1540 FOR I=1 TO NO:PRINT#-1,OT(I):NEXT
1550 FOR I=1 TO NACT:PRINT#-1,WHO(I),DATDUE(I),DTSNT(I),DOLDEP(I):NEXT
1560 FOR I=1 TO NCAR:PRINT#-1,RSNM(I),AGNCY(I),PDAT(I),PLC(I),RDAT(I),RETL(I):N
EXT:GOTO 100
```

PROBLEMS?

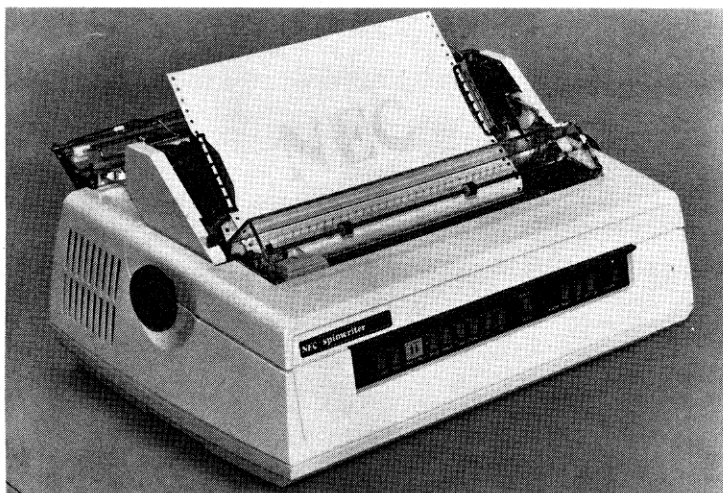
Are you having trouble with advertisers or products?
If such is the case, please write to the firm
giving complete details and send a copy of your letter to
Wayne Green, 80 Microcomputing,
Peterborough, New Hampshire 03458.
Be polite—no matter how badly you're shafted.

We're looking for names and addresses of all the TRS-80 news-
letters out there. If you produce or are affiliated with such a
newsletter, please drop a line to:

Jim Perry, Managing Editor
80 MICROCOMPUTING
Peterborough NH 03458

Thanks.

DISCOVER THE MAGIC OF WORDPROCESSING AND TURN YOUR TRS-80* INTO A VERITABLE "OFFICE WIZARD" WITH A "NEC SPINWRITER"



NEC 5530

(CENTRONICS I/O)

What makes NEC your best typewriter quality printer value?

1. The one and only print "thimble." SPINWRITER'S DURABLE (up to 30 million impressions) and unique reinforced plastic print element. Up to 128 characters per print element, with a wide variety of typefaces to choose from.
2. **SPEED and RELIABILITY.** The SPINWRITER gives you up to three times the speed of IBM "Golf Ball" type mechanical printers, along with the advantages of a true electronic output printing device.
3. **HUMAN EAR COMPATABILITY.** The low pitched strumming noise made by the NEC Spinwriter won't leave your ears and nerves aching after a hard day's use, as Dot Matrix and mechanical printers tend to.

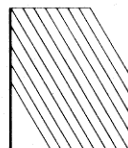
THE NEC SPINWRITER
IS FULLY SERVICED BY NEECO.

NEC 5530 SPINWRITER (plug compatible to TRS-80*) **\$2770.00**
Word Processing Software "Electric Pencil" **\$ 100.00**

Call or Write today for NEC Specifications Sheet. (Specify TRS-80*)

*TRS-80 is a Trademark of Tandy Corp.

✓ 143



NEECO

679 Highland Ave.
Needham, MA
02194

Mon-Fri 9:30-5:30
MasterCharge &
Visa Accepted

(617) 449-1760

Even Radio Shack dealers have had to learn about the 80 the hard way.

A Dealer's Experience

S. M. DeFonzo
Channel One/Radio Shack
P.O. Box 427
Medford, NJ 08055

I first heard about the TRS-80 at the annual meeting of Radio Shack dealers in August, 1977, at Cape Cod. There was a 15 or 20 minute presentation during which the magic words, inventory and payroll were murmured and that was all it took for me to be the first to jump up with a check for the required \$100 deposit.

Imagine—all my problems solved for just \$598!

I wouldn't want you to think that I was completely naive. I knew the difference between a bit, a byte and binary, though not thoroughly enough that I tried very hard to work it into a conversation. I once crammed for a College Equivalency Test on Electronic Data Processing and passed! I had taken a course in programming that explained logic tables, number base systems and other programming information but the test, that could have been lifted from an IBM hardware brochure, wanted to know such things as the speed of data transfer from specified disk drives.

Blackjack and Backgammon

Our computer arrived in November, 1977. We played Blackjack for a little while, then learned the rules for Backgammon and played that until our Radio Shack payroll program arrived.

Looking back, I realize that it

wasn't much of a program. It was limited to 12 employees; I had to tell it how much to deduct for New Jersey income tax; I endlessly fed data onto and off of cassettes that had to be carefully marked so that you had the most current one.

I worked through the Level I manual and felt, now that I was an "expert programmer," I could not only improve on their payroll program, but I could write one of my own to handle sales slips and help with my inventory problems.

We stock approximately 3500 different items in the retail portion of our business and thousands of parts for our service operation.

Over the next few months, we added Level II Basic, an expansion interface, a line printer and installed 16K of memory. The TRS-80 was doing our payroll. It calculated commissions, hourly (with overtime) and salary amounts, federal and state deductions and printed the paystubs. All I had to do was write the checks and sign them.

My need for an inventory management system was still as urgent as ever, but I had my sales slip program running. I entered part numbers, quantities and prices for each item on each sales slip and specified categories like CB, TV, Audio, Parts, Service. The program checked sales tax, extensions, totaled each column and then gave me a sorted list of parts sold.

Well! That may not sound like much to you, but it's a lot easier to go through 3000 index cards,

in sequence and remove all the sold items at once, than to go back and forth over drawers of cards subtracting batteries sold, one at a time.

Modifications

Time passed and I was getting monthly summaries of sales by category and gross margin on each of the categories. I had come a long way. Level II was no longer a mystery. I even understood arrays. (There was a time when I thought I would never get that!)

We modified our computer a number of times as fixes for problems were discovered. We had about \$3000 in it now. I was hooked, working nights on my programming, while running the business during the day. We ordered our first disk drive and I was ready for the big time.

The drive arrived December 19, 1978. It came with one diskette that contained the DOS and about 16 sheets of instructions. Actually, 10 of the sheets were instructions and the other 6 were additions and corrections to the first 10.

I had never seen a disk drive before and had never even heard of a disk operating system. I had no idea which end of the diskette was up and the instructions didn't help much, but I soon figured it out and had no trouble saving programs and loading them back from disk.

Heaven, after a year of cassette tapes!

But the instructions were of absolutely no help in creating data files. I shot Christmas, while I tried. The day after I

drove 150 miles to buy an inventory system from another Radio Shack dealer and installed another 16K in my expansion interface. Because I couldn't even back up a diskette, I drove another 30 miles each way to find a computer store with diskettes in stock.

I spent every waking hour at the computer. I tried to learn Disk BASIC, data file manipulation and I entered inventory items—physically counting stock so that I'd be entering accurate data.

Our inventory system, as originally purchased, had no provision for tracking costs and gross profits. The accountant in me wouldn't tolerate that, so I added that capability and a few more features.

Later I ran into the original programmer at a show and told him about the changes I'd made, showed him examples of the reports the program was now generating, pointed out the little trick I'd found to cut the sale cycle time in half. Three weeks later I received an ad from him offering the improved inventory system! He was willing to sell me my ideas! That's when I learned why programmers are so close-mouthed.

Smooth Sailing/Choppy Waters

I'd like to report that all went smoothly from then on, but it didn't. We had one of the earliest TRS-80's and Tandy didn't know yet about buffered cables and separated power lines. The little piece of ribbon cable that connects the two PC boards in the CPU had been flexed so of-

TRS-80*

SAVE A BUNDLE

When you buy your TRS-80™ equipment!

Use our toll free number to check our price before you buy a TRS-80™ . . . anywhere!

TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

full Radio Shack warranty



✓ 148

SALES COMPANY

P.O. BOX 8098 PENSACOLA, FL 32505
FLORIDA 904/438-6507
nationwide 1-800-874-1551

!!NOW AVAILABLE!!

INDEX SEQUENTIAL ACCESS METHOD

- * Get and Put Records to Disk File by "KEY"
- * Read File in Key Sequence Without Sorting
- * Delete Records Without Recopying File
- * Add Records to Disk Files in Any Sequence
- * Variable Key Length From 1 to 50 Characters

BUSINESS APPLICATION ADVANTAGES

- Improved Disk Utilization
- Easier Program Development
- Improved Operating Characteristics
- Reduce or Eliminate Sorting
- Improved Performance

ISAM SUBROUTINES
ISAM UTILITIES

Documentation
On Diskette \$50.00

- PLUS - Free Mailing List Sample Application
- Add 6% Sales Tax for California Orders

TRS-80 MODEL I & II SOFTWARE FROM:

Johnson Associates -or- 24 Hour Order Line
P.O. Box 1402M For Bank Card Sales
Redding, CA 96001 (916) 221-0740

WRITE FOR FREE CATALOG ✓ 85

For Your TRS-80*

DUAL DISK-32K
BUSINESS SYSTEM

QUALITY DTI PAYROLL

No. 410

DATA TRAIN'S many years of small business computer experience in accounting program products brings to your business all of the quality features, functions, screen displays, standard reports, user designed reports and operator reference manuals; allowing you to efficiently manage the payroll of your company.

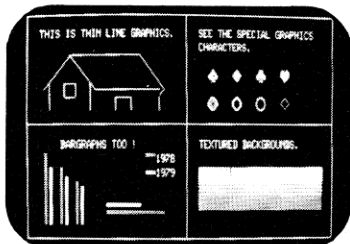
- 50 employees per mini-disk.
- Runs in all states.
- You maintain the P/R product without programming.
- Flexible, easy to use.
- No maintenance fees.

\$235.

Product Info &
License/Order
Form.

FROM.....

TRS-80™ LOWER CASE AND GRAPHIC SYMBOLS GENERATOR KIT.CG-16 \$94.50



TRUE 2 LINE DECENDER LOWER CASE, ELECTRONIC SYMBOLS, THIN LINE GRAPHICS, GAME SYMBOLS, TEXTURED BACKGROUNDS, AND MANY MORE. COMPATIBLE WITH BASIC, ALL DOS AND MACHINE LANGUAGE PROGRAMS. DEMO CASSETTE IS INCLUDED. ELECTRIC PENCIL TYPE L.C. MOD. IS REQUIRED. IF NOT, ADD \$18.50 FOR MEMORY AND SWITCHES KIT.

TRS-80 IS A TRADEMARK OF TANDY CORP.

ADD \$1.50 FOR SHIPPING AND HANDLING. CALIF. RESIDENTS ADD 6% SALES TAX. SEND CHECK OR MONEY ORDER TO:

G.P. ASSOCIATES, P.O. BOX 22822, SACRAMENTO, CA 95822

✓ 204

TRS-80™ SYNCHRONOUS DATA SEPARATOR FOR DISK USERS. SDS \$34.50

IF YOU ARE EXPERIENCING READ OR SEEK ERROR ON THE INNER MOST TRACKS OF YOUR DISK DRIVES. THIS IS BECAUSE THE DATA SEPARATOR AS RECOMMENDED BY THE DISK CONTROLLER'S MANUFACTURER IS NOT IN YOUR EXPANSION INTERFACE. THE SYNCHRONOUS DATA SEPARATOR WILL ELIMINATE 100% OF THE DISK READ ERRORS AND SPEEDS UP DISK ACCESS TIME BY ELIMINATING RETRIES BY THE DISK CONTROLLER, NO MORE PREMIUM DISKETTES TO BUY. THE SDS DOES NOT USE ONE-SHOTS AND IS THE MOST RELIABLE AND ACCURATE DATA SEPARATOR AVAILABLE.

ADD \$1.50 FOR SHIPPING AND HANDLING. CALIF. RESIDENCE ADD 6% SALES TAX. SEND CHECK OR MONEY ORDER TO:

G.P. ASSOCIATES, P.O. BOX 22822, SACRAMENTO, CA 95822

✓ 203

DATA TRAIN INC.

PHONE

(503) 476-1467 ✓ 44

840 N.W. 6th STREET, SUITE 3
GRANTS PASS, OREGON 97526

Available Soon-

- General Ledger Accounting
- Accounts Payable
- Accounts Receivable
- Fixed Asset Accounting

*Trademark Radio Shack, Div Tandy Corp.

ten by our upgrading and modifications that some of the sections that should have had connecting wires didn't have them any more.

I learned the hard way about backups, backups, backups. We even rewired our store, when we realized that the computer crashed every time the compressor of our old refrigerator went on. Then we bought an isolation transformer thinking that our service shop might be part of the problem—stray voltages and all that.

In desperation, we had the Level II board replaced, and that did it! Now our inventory system was finally running reliably and everything in the store had been entered into data files.

We moved the computer out to the front of the store because the system was designed to print out the sales receipt at the point of sale. I was turning my baby over to our ham-fisted sales people for the acid test—and they didn't like it at all! The TRS-80 had no tolerance for approximate entries, and my sales people used to jot cryptic notes on receipts which they relied on me to interpret. It had given me fits while I was entering their sales slips.

I suppose they did everything to that poor inventory system that could have been done, from jamming diskettes in upside down (if anyone has any ideas what to do about disks with ruffled centers, please pass them along) to setting car speakers, preferably the ones with 20 oz. magnets, on top of the disk drives.

They were entering everything in the miscellaneous category which was supposed to be reserved for those few items that had not yet been entered in the data files. It was just too much trouble for them to use the correct stock number.

Money changed their attitude! Formerly they were being paid a percentage of total sales. This was a great incentive to move things out—regardless of price—and put me in the ridiculous position of occasionally paying a commission on an item that we sold at a loss.

We changed the system so

that they were paid a percentage of the gross profit—the difference between what we paid for it and what it sold for. The computer gave them credit only if the cost was known, so the item had to be entered correctly.

I learned about idiot-proofing systems. Anybody can write a program to be used by computer experts, but writing a program used in full view of an impatient, intolerant customer, by someone who can't even type—that's another thing altogether.

First Project

We began this project because we needed an inventory system that would automatically reorder merchandise. I used to spend at least one Sunday a month, from eight in the

I'm doing all this with hardware that lists for \$4800: a TRS-80 with Level II and 32K of memory; 3 minidisk drives; and a tractor-feed line printer.

None of our employees feel threatened by the computer any more. They are intrigued by the novelty and enjoy showing off—"Look at me, I'm a computer operator!"

Management Advantage

As for me, I know more about our business and which categories of merchandise are worth the trouble and expense of stocking, counting, dusting. There are no more traumatic confrontations with personnel, "You're not paying me what I'm worth" or with sales reps who flash fancy figures.

In desperation, we had the Level II board replaced, and that did it.

morning until well into the evening, making up an order for the little packages of hardware and tools that you usually see hanging on pegboard walls. I was very conscientious at the beginning of the day, adding up the quantities sold in the last quarter as listed on my index cards and plotting the exact number of each item I should order. But, by "Sixty Minutes," when I was getting into all the audio cables, my patience deteriorated. By the time I got into the little plastic bags of screws and spade lugs, if we needed any at all, we got a dozen. (The computer now does this job in less than 15 minutes without human attention and I spend my Sundays programming, which is lots more fun.)

But now we are doing so much more. We have a complete business system up and running—the reliability is extremely good, even when used by novices. All of the accounting data regarding sales and costs and commissions are automatically entered into the General Ledger. This interactive system minimizes the opportunity for errors.

I have solid, objective, unarguable data on which to base business decisions. Our technicians are given a goal that they must bill—exceed that goal and they get a raise. Miss it by more than ten percent two months in a row and they are looking for another job.

Our insurance is based on real inventory amounts—not "guesstimates." I have exact sales data every day, a perpetual inventory, and my financial statements by the second of the month which allow me time to make required changes in advertising budgets, orders, etc., while they can still do some good.

When prices increase, I have the new prices in the computer in a matter of minutes. Nobody can switch price tags on us. I can stock smaller quantities of each item because it's so easy to make up an order, therefore I have less money tied up in inventory. There is a certain discipline that is forced by a computerized business system. "This" can't be done until "that" is finished and as a result less paperwork piles up on my desk.

Our greatest problem now is that business programs available for low-cost systems are generally written by programmers, not by accountants or business people. And they're written to sell, not to use.

For example, I purchased the Osborne books and learned about features that could be included in business systems. I was impressed so I bought the rights to one of the TRS-80 BASIC interpretations of the Osborne General Ledger. It is chock full of clever programming. I learned from it as I have from most of the programs I have studied. But the things it *doesn't* do are appalling.

For instance, the annual statements don't show last year's figures as a basis for comparison with this year's figures. That's one of the major purposes of a profit and loss statement!

I have a unique vantage point in this whole matter of small business systems. I am an accountant; I use my TRS-80 to run my own retail and service business; I have paid my dues as a programmer; and I am a pragmatist.

As a Radio Shack dealer, I have a few additional advantages—but not as many as you might think. We can buy more cheaply than you (unless yours fell off a truck). And we sometimes hear about new products before you do. But we usually learn about solutions to problems from *Microcomputing* or one of the other magazines. We don't get any more training or any better service than you—Tandy VIP's figure they don't have to convince us. We don't get free catalogs or free batteries. (We even have to buy the battery cards!)

But where the computer is concerned, Radio Shack dealers have the best of all worlds. We can carry any Radio Shack merchandise we wish, but, unlike company-owned stores, we can also buy from other sources.

Incidentally, dealers have to pay shipping costs both ways when defective merchandise must be shipped to the repair center. We even have to buy the special forms required by Radio

Shack. So those ads you see in the magazines from Radio Shack's that offer equipment at a discount and invite you to have the warranty honored at any Radio Shack store are certainly not referring to ours, nor to any of the other dealers we know.

We are sold on the TRS-80, though we can sell any system we wish. We believe that there is no need to wait any longer for a small business system. We don't recommend that you develop it the way we did, unless you have two years you don't know what to do with. There's no need. Good software is available and that is the most important part of your purchase and the people providing it.

Please don't shop primarily for price or speed of delivery. Make a list of the tasks you want a computer to do for you. Be specific. Be warned that you will need a couple of weeks of hand-holding and your people will need a bit of training, though good programs minimize the

need for training.

See the exact system you will be buying in use. Try it yourself and see what happens if you enter the wrong information. How easy is it to goof things up and to recover from the goofs? Examine the reports it generates and get your accountant to examine them.

Don't buy promises; every programmer has a terrific routine that will be ready in the next week or so. (I've got one myself.) Find a system that does just about everything you want it to do right now.

If some of your requirements are unique customizing is usually no big problem but major changes can create major headaches.

Lastly, find a dealer who knows business systems; buy your entire system from him, so that he feels an obligation to help you through the start-up problems. Then buy it. We think you'll wonder how you ever operated a business without it. That's how we feel! ■

INTELLIGENT TERMINAL SOFTWARE WITH FULL PAGING CAPABILITIES • CASSETTE AND DISK VERSION •

Z80 ASSEMBLY LANGUAGE PROGRAM GIVES YOUR COMPUTER THESE FEATURES:

- Line Scroll Up/Scroll Down
- Page Up/Page Down
- Screenlock Top and Bottom
- Full Cursor Control
- Memory Buffer Overflow Protection
- Automatic Right Justification
- Automatic Formatting
- Full/Half Duplex
- Disk Version-File Upload/File Download

LEVEL II COMPUTERS — TERMCOM™ RS-232 INTERFACE BOX GIVES YOU INTELLIGENT TERMINAL CAPABILITIES WITHOUT EXPANSION INTERFACE.

TERMCOM™ RS-232 Interface Box Includes RS Connector, Power Cables and Cassette Intelligent Terminal Software..... \$129.00
Disk Software..... \$ 45.00
Documentation Only..... \$ 10.00

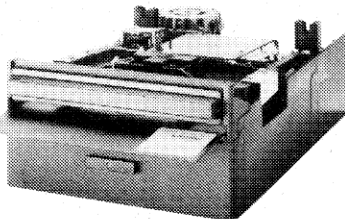
STATCOM INC. 189

5758 Balcones Drive Suite 202
Austin, Texas 78731 512/451-0221

Sirius Systems introduces lower prices to quality drives! 67

Remex RFD 4000/8"
Floppy Disc Drive
Double the storage!
Double sided...
Double density!!

549⁹⁵



Offers quality and features found in drives costing much more! ■ Single or Double Density ■ Double-Sided Drive ■ Door Lock INCLUDED ■ Write-Protect INCLUDED ■ 180 Day Warranty ■ Compatible with Shugart 850/851 ■ Low Power Operation ensures LONGER LIFE!! ■ Model RFD 4001 offers Data and Sector Separator

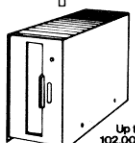
AVAILABLE OPTIONS/ACCESSORIES

- ☐ Dual Drive Power Supply and Cabinet, \$139.95
- ☐ Single Drive Power Supply and Cabinet, \$119.95
- ☐ RFD 4000 Manual, \$5.95
- ☐ Interface Manual, \$2.95
- ☐ Drive Cabinet, \$29.95
- ☐ RFD 4001, \$564.95

SIRIUS 80plus

The Perfect
Add-On for
your TRS-80*

- Comes complete ready to plug in and run!
- 5ms track to track



Up to
102,000
bytes

SIRIUS 80+1
(Single Head) **\$349⁹⁵**

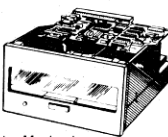
SIRIUS 80+2 (Dual Head) **\$419.95**

*TRS-80© Tandy Corp.

MPI-51/52

A Great
Reliable
Mini-Drive!

- Fast! 5ms track to track access
- Exclusive Pulley-Band Design
- Unique Door/Ejector Mechanism
- Reliable 1 1/2 % Speed Stability

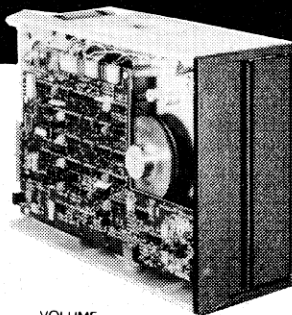


MPI-51
(Single Head) **\$259⁹⁵**

MPI-52 (Dual Head) **\$349.95**

Remex 1000B
If you've been looking for a
less expensive floppy disc
drive, but not wanting to
sacrifice quality—
your search is over!

419⁹⁵



VOLUME
DISCOUNTS AVAILABLE

You get both in the Remex 1000B! For only \$419.95 look at what you get: 8" Floppy Drive ■ Single or Double Density ■ Hard or Soft Sectoring ■ Media Protection Feature ■ Single Density Data Separator ■ 180 Day Factory Warranty

AVAILABLE OPTIONS/ACCESSORIES

- ☐ Door Lock, \$19.95
- ☐ Dual Drive Power Supply, \$91.95
- ☐ Interface Manual, \$2.95
- ☐ Write-Protect, \$19.95
- ☐ Single Drive Power Supply, \$69.95
- ☐ Interface Adapter, \$12.95
- ☐ Connectors, \$9.95
- ☐ Drive Cabinet, \$24.95
- (Remex to Shugart)



**SIRIUS
SYSTEMS**

P.O. Box 9748, Knoxville, TN. 37920

Phone Orders accepted 9AM-7PM (E.S.T.) 615/577-1072

☐ Check ☐ Money Order ☐ C.O.D. ☐ MC ☐ VISA ☐ AE

NAME _____ CARD # _____

ADDRESS _____ EXPIRATION DATE _____

CITY _____ STATE _____ ZIP _____ CARDHOLDERS SIGNATURE _____

Add \$7.00 per Drive for Shipping/Handling. Tennessee residents add 6% sales tax. Foreign orders add 10% (payment in U.S. currency only)

The Original "Photo point" Light Pen

ONLY
\$19.95

Why pay \$30.00, \$35.00, \$62.00 for
the same results??

Don't be misled by more expensive imitations!

This is the **original Photo point** light pen preferred and supported by some of the leading software sources like, "Quality Software" — "Instant Software" — "Level IV" products and so on.

Just imagine...

In playing backgammon, (included) when you want to move a man, you just point at where you want to move from, then point at where you want to move to, and your man moves!!! No more fumbling with keyboards—YEA!

Your Photo Point package comes complete;

- 1 Photo point light pen (of course)
- Info sheets on how to connect the pen and how to write your own programs
ALL IN BASIC
- Two apertures
- AND two sensitivity settings
- A cassette tape with 4 informative programs and games
- Ready to connect to your TRS-80 System. (DOS too!)
- Does not void any Radio Shack warranties

Requirements:

- Level II basic
- And a little *imagination!!*

For fast real time programming it is your lowest cost peripheral at \$19.95

Announcing

NEW PEN BASIC by Steve Bjork

Steve is one of the Best Assembly Lang. programmers around, and he has come up with PEN BASIC. This low memory routine will add 6 more commands to Level II such as PENGET which searches the entire screen for the pen and returns a number between 0-1024 in about 1 sec. Plus 5 other commands. Perfect for you lightware authors and **NEW** light pen owners too!only \$14.95

(COUPON)

Micro Matrix

P.O. Box 938 • Pacifica, CA 94044

Send for yours **NOW: (415) 355-4635**

Name _____ Photopoint
□ \$19.95

Address _____

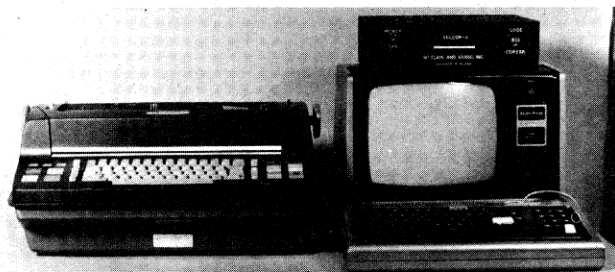
City _____ St. _____ Pen Basic
□ \$14.95

Zip _____

Card # _____ Money
Ex. _____ CK. Order Visa MC
Date _____ □ □ □ □

SILVER & BLACK

WORD PROCESSING PRINTER



IBM SELECTRIC® TERMINAL
\$795.00

TRS-80® DIRECT PARALLEL

- FUNCTIONALLY TESTED
- CABLES INCLUDED
- NO SOFTWARE REQUIRED
- OFF LINE TYPEWRITER
- DELIVERY STOCK TO 5 WKS
- PACKING AND HANDLING \$25
- SHIPPING COLLECT
- CASHIER CHECK, MONEY ORDER

RS232 SERIAL
AND/OR
CENTRONICS®
TYPE
PARALLEL
INTERFACE
ONLY \$345.00

McClain & Associates, Inc.

5104 East 65th Street
Indianapolis, Indiana 46220
(317) 842-0526



TRS-80* — CONDENSE

The Ultimate in BASIC
Compression Utilities

** Release 1.3 Now Available **



- Write BASIC programs using single statement lines for ease of maintenance.
- Write BASIC programs with unlimited remarks and comments to improve program readability and documentation....

— AND STILL GET —

OPTIMUM USE OF MEMORY — FASTER PROGRAM EXECUTION

- Compresses programs up to 70% of original size
- Improves execution time by as much as 30%
- Creates multiple-statement program lines
- Blank compression
- Remark and comment deletion
- Renumbers GOTO, GOSUB, THEN, ELSE, and RESUME statements which reference deleted line numbers
- PLUS THESE NEW USER REQUESTED OPTIONS:
 - Retention of low numbered remark statements
 - Checkpoint / Restart Facilities
 - Phase 1 work file

Model I \$21.95

(Diskette)

Model II \$24.95

(Diskette)

INTERNATIONAL SOFTWARE ASSOCIATES

P.O. Box 14805
Omaha, Ne. 68124

Tandy Corporation®

Make your programs people oriented, do away with the enter key with the techniques discussed here.

INKEY\$

Gary J. Himler
11300 Zelzah Ave.
Granada Hills, CA 91344

Programs frequently require you to interact with your computer by entering certain information via the keyboard. How often have you seen:

```
DO YOU WANT INSTRUCTIONS (Y/N)?
```

You would then respond by hitting the Y or N key, followed by the ENTER key. The program line was most likely:

```
100 PRINT "DO YOU WANT INSTRUCTIONS (Y/N)"; INPUT A$
```

Line 100 prints the message on the screen and the computer waits for your answer. However, the computer does not hear your answer until you press the ENTER key.

Reaction Time

TRS-80 Level II offers an effective way of cutting this effort in half, by letting your computer react immediately to your entry without pressing the ENTER key. Try program 1 and see what happens.

We must understand how the keyboard talks to the computer. Every keyboard character, both upper and lowercase, causes a numerical value to be output to the computer by the keyboard ROM (Read Only Memory). This numerical value is the ASCII code for that particular character or symbol. The computer interprets this ASCII code number as told to it by the program which you have loaded.

Table 1 shows the printing codes used by the TRS-80 to print a number, an alpha character or a symbol (e.g. * & # etc.). To understand how the ASCII codes work, try Program 2.

Line 10 is the PRINT statement usually used to print a message on the screen; here "ABC".

Line 20 prints the same message using ASCII com-

mands. You might guess that 65 is ASCII for "A", 66 for "B" and 67 for "C". Try to verify this with Program 3.

String Functions

Two string expressions, used in the TRS-80, relate to the ASCII code. If you want the computer to print a specific character, as we did in line 20 of Program 2 or 3, use the expression PRINT CHR\$(X).

If, however, you want the computer to listen to the keyboard for your answer, you must use the ASC(string) expression. This might be confusing at first. See if this helps:

- The ASCII code for A is 65, as shown in Table 1;
- PRINT CHR\$(65) will make the computer print A;
- PRINT ASC("A") will make the computer print 65;
- Whenever you hit the A key, the keyboard tells the computer 65.

There are also 31 control codes which cause the computer to take certain actions without printing anything on the screen. Table 2 lists the five control codes most useful to the programmer and the normal functions. Later, you will see how you can make the computer ignore these control commands, or even how to make the computer react to them differently.

The TRS-80 has an INKEY\$ command which recognizes a keyboard entry without the need to hit ENTER.

Many of my programs use the magic statement GOSUB900. This subroutine looks like this:

```
900 KB$=INKEY$:IF KB$=""GOTO 900
910 KB=ASC(KB$):RETURN
```

KB\$ stands for *Key Board* string variable. Since the INKEY\$ is a string command, it must be matched to a string variable or a TM error will occur.

INKEY\$ tells the computer to scan the keyboard and to detect a keystroke when it occurs.

IF KB\$=""GOTO 900 tells the computer to keep scanning the keyboard in the absence of a key stroke (KB\$="" tells the computer that the 'value' of KB\$ is nothing, or no input).

KB=ASC(KB\$) sets up a new variable which you can use throughout the program, equal to the ASCII equivalent of the key stroke KB\$. You can now save memory in your program by just using KB instead of having to use ASC(KB\$) each time you want the ASCII value of a key character.

Armed with all this new knowledge, let's take another look at Program 1 and try to make more sense out of each line.

Program 1 Revisited

Line 10 asks a question and passes control to line 20. Not that there is no INPUT statement requiring an ENTER action, yet, the computer halts and waits for you. This is accomplished in line 900.

Line 30 is the decision maker.

```
5 CLS
10 PRINT "ARE YOU OVER 21 (Y/N)?"
20 GOSUB 900
30 IF KB = 89 PRINT @320, "HOW ABOUT YOUR PHONE NUMBER?":END
40 PRINT @320, "HERE IS A DIME — CALL ME WHEN YOU ARE!"
899 END
900 KB$=INKEY$:IF KB$=""GOTO 900
910 KB=ASC(KB$):RETURN
```

Program 1.

```

5 CLS
10 PRINT @320,"ABC"
20 PRINT @448,CHR$(65);CHR$(66);CHR$(67);
30 GOTO30

```

Program 2.

```

5 CLS
10 PRINT @320,"TO ERASE THIS LINE HIT ";CHR$(93)
20 GOSUB 900:IF KB<>8 GOTO 20
30 PRINT @320,CHR$(30);

```

Program 4.

```

5 CLS
10 FOR N = 32 TO 55; FOR Y = 0 TO 3: Z = (N + 24 * Y)
20 PRINT Z; CHR$(Z);NEXT Y,N

```

Program 3.

Since 89 is the ASCII value for Y, the computer executes the print statement of line 30 if the key stroke is Y and drops to the print statement in line 40 if the key stroke is not Y.

What would happen if you entered G or Z or any other character instead of just Y or N? Well, since our program only tests for Y, any other character passes control to line 40 and the Not Y statement is printed.

INKEY\$ to the rescue! Add line 35:

```
35 IF KB<>78 GOTO 20
```

This tells the computer: If the input was not Y (line 30 did not take control), then you must ignore any other input except N (the ASCII code for N is 78); otherwise stay right in the INKEY\$ subroutine.

How often have you inadvertently hit the wrong key when answering your computer, giving it an instruction you could not undo—like hitting the CLEAR key when you did not mean to? Or the ↓ key which promptly but erroneously erased the next line on the screen?

Well, as you might expect, INKEY\$ helps again. Let's say you want to protect against those two wrong inputs that we just mentioned. Change line 20 of Program 1 as follows:

```
20 GOSUB 900:IF KB=10 OR KB=31
GOTO 20
```

From Table 2 you see that 10 is the ASCII code for Line Feed (↓) and 31 is the code for CLEAR. You have now told the computer not to accept those two com-

mands. If they occur, the program goes right back to subroutine 900 and waits for another key stroke. To understand the implications of this statement, delete line 35 which you added a little while ago. Now the computer will ignore only the CLEAR and Line Feed commands and accept any other input besides Y as a No answer.

Instead of telling the computer to ignore certain control codes, you can instruct it to use these control codes for purposes other than their normal ones.

Different Functions

For example, the backspace character (←) normally results in wiping out the last character on the screen. What if you wanted that same key to erase the entire line instead? Program 4 shows you how.

Add the familiar lines 900 and 910 as in Program 1 and examine the statements. You'll notice two things.

First, the computer now prints the actual backspace character ←. Since hitting the backspace key tells the computer to do its "backspace" act, it does not print the backspace character. This key is one of the nonprinting codes. As you see from Table 2, the backspace key actually gives the computer the ASCII code of 8.

We can see from Table 1 that ASCII code 93 prints the symbol ←. Thus, the print statement of line 10, calling for CHR\$(93), prints the backspace character and the decision statement of line 20 ignores all but the backspace key (KB = 8).

If you hit the backspace key, control passes to line 30, which brings up the second new point, PRINT CHR\$(30) instructs the computer to exercise the control code 30, which causes the line to be erased.

Do I hear some of you say "Oh yeah? KB\$ is a string variable! How do you get the computer to react to a numeric keyboard entry?"

Actually there are two ways to do this. First you can use the KB\$ notation for numbers as well as for letters. Table 1 shows that the ASCII codes for 0 through 9 are 48 through 57. So if you want the computer to react to a keystroke of 6, you program "IF KB\$ = 54 THEN"

And there is another way. VAL(KB\$) extracts the numeric

equivalent of the string variable KB\$. So you can also program "IF VAL(KB\$) = 6 THEN". If you have a lot of numerical decisions to make, you will save memory by creating a new variable, for instance N with the statement:

```
LET N = VAL(KB$)
```

which will allow you to use the shorter statement "IF N = 6 THEN . . ."

How will we protect against "out of limit" numerical entries? Suppose we have a menu of choices, numbered from 1 to 5. The program will probably crash if you were to input 0 or 6. To guard against this, use the statement in Example 1.

I can hear you already!

Code	Key	Normal Function
8	←	Backspace and erase last character
9	→	Tab to next index position
10	↓	Line feed
13	ENTER	Carriage return and line feed
30	none	Erase to end of line
31	CLEAR	Erase to end of page

Table 2. Control Codes

Code	Character	Code	Character	Code	Character	Code	Character
32	space	56	8	80	P	104	h
33	!	57	9	81	Q	105	i
34	"	58	:	82	R	106	j
35	#	59	;	83	S	107	k
36	\$	60	<	84	T	108	l
37	%	61	=	85	U	109	m
38	&	62	>	86	V	110	n
39	'	63	?	87	W	111	o
40	(	64	@	88	X	112	p
41	)	65	A	89	Y	113	q
42	*	66	B	90	Z	114	r
43	+	67	C	91	↑	115	s
44	,	68	D	92	↓	116	t
45	-	69	E	93	←	117	u
46	.	70	F	94	→	118	v
47	/	71	G	95	—	119	w
48	0	72	H	96	shift @	120	x
49	1	73	I	97	a	121	y
50	2	74	J	98	b	122	z
51	3	75	K	99	c	123	shift ↑
52	4	76	L	100	d	124	shift ↓
53	5	77	M	101	e	125	shift ←
54	6	78	N	102	f	126	shift →
55	7	79	O	103	g	127	—

Table 1. ASCII Character Codes

"Well, that's great. But what do you do if you must enter a number with more than one digit? After all, the INKEY\$ command makes the computer react immediately to a keyboard input."

Well, you've got me there! But you can still take advantage of the INKEY\$ command, followed by the ENTER command.

Let's assume you have a menu of 12 items. You might use Program 5.

Line 100 accepts keystrokes between 0 and 9. On the first keystroke N equals the numeric

value of the keystroke.

Line 110 tests for an ENTER command (ASCII code of 13). In the absence of an ENTER command, control is returned to line 100. When the second keystroke is also between 0 and 9, the existing value of N is multiplied by 10 and the new keystroke (VAL(KB\$)) is added to that result. Line 130 rejects answers less than 1 or greater than 12.

INKEY\$ is a powerful command. Learn how to use it and it will pay big dividends helping you write more professional programs. ■

```
100 GOSUB 900 : IF KB>47 AND KB<58 N = 10 * N + VAL(KB$)
110 IF KB<>13 GOTO 100
120 IF N<1 OR N>12 GOTO ....
```

Program 5.

```
50 GOSUB 900 : IF VAL(KB$)<1 OR VAL(KB$)>5 GOTO 50
```

Example 1

VERBATIM® ATHANA® GEORGIA MAGNETICS®

Floppy Diskettes for ANY COMPUTER SYSTEM

8" Floppies only \$3²⁰ ea.

HUNDRED LOTS

10 for \$3.65 ea. • 50 for \$3.40 ea.

We reserve the right to ship either of the name brands that we carry.

5 1/4" Mini-floppies only \$2⁶⁰ ea.

HUNDRED LOTS

10 for \$3.10 ea. • 50 for \$2.85 ea.

SPECIFY SIZE, TYPE, & COMPUTER

5 1/4" Soft Sector, 10 Sector, 16 Sector—8" IBM Compatible, Hard Sector

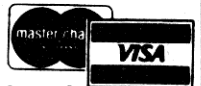
CALL TOLL-FREE 24 HRS. TO ORDER

800-824-7888

OPERATOR 814

CALIFORNIA 800-852-7777

Schools and universities
gladly serviced C.O.D.



DC SOFTWARE & COMPUTER PRODUCTS
POST OFFICE BOX 503

SAN BRUNO, CALIF. 94066

FOR INFORMATION 415-348-2387

✓ 59

TRS-80*

	Reg.	Our Price
• Level II-16K	849.00	749.00
• Expansion Interface	299.00	264.00
• Centronics Printers		799.00 & up
• Verbatim Diskettes		3.20 ea.
		or 32.00 box of 10
• Pertec Disk Drives		389.00
• TRS-80 Disk Drives		449.00

Business Software by

- Robitron
- Data Access Corp.
- Newdos + by Apparat

Savings on all Radio Shack TRS-80 hardware & software

Radio Shack®
dealer

Garner's

Computer Center ✓ 206
615 East Avenue
Cedartown GA 30125
404-748-3614 or 748-8585

* TRS-80 is a trademark of the Radio Shack Division of Tandy Corporation.

SOFTWARE AND HARDWARE FOR MODEL I COMPUTER

DISK DRIVES

HIGH-SPEED PRINTERS

MICRO-COMPUTER CASSETTES

DISKETTES

BUSINESS AND PERSONAL

PROGRAMMING

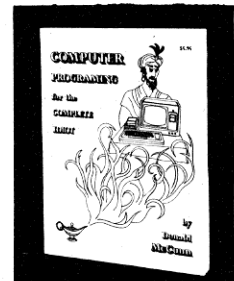
UTILITY PROGRAMS

CUSTOM PROGRAMMING

MODEL I COMPUTERS

CIRCLE READER SERVICE NUMBER
OR WRITE FOR BROCHURE

COMPUTER GENERATED DATA
700 Baker Road Suite 115
Virginia Beach, Virginia 23462
(804) 497-1165 ✓ 130



CREATE YOUR OWN PROGRAMS

Custom programs are the best way to ensure that your computer does what you want. "Computer Programming for the Complete Idiot" simplifies programming by describing a format that shows how to organize BASIC into meaningful programs that achieve specific tasks. A Payroll Program is used as an example. Detailed instructions then show how to apply this process to creating original programs.

This book features the TRS-80 and is an excellent guide for the beginner with many useful references for the advanced programmer.

ONLY \$5.95 - 128 PAGES

Please send me ___ copies of "Computer Programming for the Complete Idiot" at \$5.95 each plus \$1.00 for shipping. (California residents add sales tax of \$0.36 per book.)

☐ Check or Money Order Enclosed.

Charge to my: ☐ Master Charge ☐ Visa.

Card No: _____ Exp.: _____

Name: _____

Address: _____

Zip: _____

DESIGN ENTERPRISES OF SAN FRANCISCO
Dept. 803, P.O. Box 27677
San Francisco, CA. 94127 ✓ 139

Create a collection of your favorite utility programs and load them with a single command.

Service Tape

Howard Flatley
232 Fiesta Lane
El Cajon, CA 92021

Powering up the TRS-80 without a disk system in Level II must include a SYSTEM load of the keyboard debounce routine. Unless you enjoy repeating key inputs, that is.

This article enables you to cut that power-up time in half and to consolidate your SYSTEM pro-

grams onto a single cassette. For those who are new to machine language programming, as I am, a technique for loading more than one machine language program into reserved RAM will be given.

The Service Tape

While programming in BASIC, I gathered a couple of short utilities that I often found useful. When I desired access to machine language on the TRS-80, the need for utilities

grew.

The SYSTEM and BASIC programs that I use most often are listed in Table 1. I consider these programs as tools to accomplish a job. While programming, I had several of these tools, on individual cassettes, lying about the keyboard. This led to problems, including loading the wrong tool and losing time searching for the correct cassette.

My solution was the TRS-80 Service Tape. The tape is composed of all the programs listed in Table 1 in the order of priority shown.

I use a Level II, 16K RAM TRS-80 and a CTR-41 tape recorder. TRS-80 users with the same configuration may use the addresses as they appear. For other RAM sizes you will have to consult your program and computer documentation.

Power up the TRS-80 and set MEMORY SIZE? to 31700. This reserves 1067 bytes in high RAM. Using the SYSTEM command, load RELO. Enter B under the RELO control commands. "+B 7FFF", appears on the CRT.

Type 7C0B to change the end address of where KBFIX will be loaded. Enter S, and when "KB DEBOUNCE ROUTINE" appears, enter L to load KBFIX. This procedure loads the debounce routine at addresses 31701 to 31755. The tape recorder must be kept in play during these steps. To exit RELO command mode enter E.

Remove the debounce tape, insert the RENUM program and make any volume adjustments required. Set the recorder to play and load RENUM. When the SYSTEM prompt (*?) appears following a successful load, press the BREAK key. RENUM and KBFIX are now resident in the reserved RAM of the TRS-80.

To create your Service Tape, you will need either T-BUG or "MONITOR" (see Table 1). I used T-BUG and will confine my description to that method.

Remove RENUM from the recorder and insert and load T-BUG.

Using the M and X T-BUG commands, check the following addresses:

Hex Add.	Hex Contents	Remarks
7BD4	03	KBFIX start
7C0C	03	KBFIX end
7C4C	31	RENUM start
7FC6	20	RENUM end
4380	ED	T-BUG start
497F	44	T-BUG end

If everything appears okay, you are all set to create your Service Tape. However, if things don't check out, perhaps the RAM location addresses will give you a clue to the error.

Assuming you are ready to proceed, place a fresh 30-minute tape in the recorder. Set the counter to zero and prepare to RECORD. Using the T-BUG PUNCH (save) function, type in:

Name	Source	Provides	Remarks
KBFIX & RELO	Radio Shack (2 on 1 Tape)	Keyboard debounce & Relocation	Machine language 55 bytes, cures Level II keyboard input bounce Price \$2.99
RENUM (26-2004)	Radio Shack cassette	Renum of BASIC line #	Machine language 960 bytes, picks up GOTO, GOSUB, etc. Price \$9.95
TBUG (26-2001)	Radio Shack cassette	Z-80 Monitor Level II	Machine language 2560 bytes, debugging aid Price \$14.95
"Universal Number Converter"	Kilobaud Microcomputing Nov. 1978	Base to base number transfers	BASIC, number base conversion (2 to 16) See "Letters" Feb. '79
"MONITOR"	Kilobaud Microcomputing June 1979	TRS-80 Ass. Lang. Oper. System	BASIC, Hex memory dump, etc. See "Letters" Sept. '79
"Whip File Wipeouts"	(1) Kilobaud Microcomputing July 1979	Program merge capability	BASIC, combines BASIC (CLOAD) programs See "Letters" Oct. '79
"How to Merge Programs Using CLOAD Command"	(2) Radio Shack Microcomputer Newsletter July 1979	Same as (1) above	Same as (1) above
"Quick Print Your Video Screen on the Line Printer"	Radio Shack Microcomputer Newsletter July 1979	LPRINT CRT to Line Printer (16 lines)	BASIC, when exe- cuted outputs CRT to L.P.; may be used for TRON statements

Table 1. Programs and Routines

(#) P 7BD4 7C0B 7BD5 KBFIX (ENTER)

This will rapidly record the debounce routine.

Advance the tape (I went to 15) and set up to RECORD. The CRT will show "# D5 KBFIX" from your previous recording. As you enter your new statements these characters will be overwritten and will not interfere with the new entries. Type in:

(#) P 7C4B 7FFF 7C4C RENUM (ENTER)

Advance the tape again (you are keeping a record of counter positions, aren't you?) and set up to record T-BUG. Type in: RENUM will immediately begin to dump to the tape. When the dump is completed, "# 4C RENUM" will appear on the CRT.

(#) P 4380 497F 4381 T-BUG (ENTER)

T-BUG takes a little longer to

*On some versions of T-BUG, the only CRT display will be the prompt (#) on completion of recording.

record. "# 80 T-BUG" appears on completion.

You now should have a SYSTEM tape that replaces three tapes. Before we pack away the originals let's test the new Service Tape. Rewind the tape and reset the counter.

Testing the Service Tape

Set the recorder to play and make required volume adjustments. My TRS-80 normally records at 6, but plays back at about 5 on the volume control.

Shut off the TRS-80 and wait a minute. Power up and set MEMORY SIZE? to 31700. Enter the commands SYSTEM, then KBFIX. The debounce routine should load and the system prompt will appear. ENTER /31701 and READY appears.

The debounce routine is resident and patched to BASIC at this point.

During some operations, such as a jump from T-BUG to BASIC, the patch may be broken. To reinitiate the patch, enter SYSTEM, then / 31701.

Follow the same procedures as above and load RENUM. After a successful load, a SYSTEM prompt will appear. Press the BREAK key to return to BASIC.

CLOAD a short BASIC program. Enter SYSTEM, then / 31820 to call the renumber routine. Use RENUM to renumber the BASIC program and to check out performance. When satisfied that all is well, enter NEW.

The KBFIX program, with patch to BASIC, and the RENUM program will not be affected by the NEW command.

Using the SYSTEM commands, load T-BUG. Following a successful load, answer the system prompt with / ENTER. The left of the CRT should clear, and the T-BUG prompt(#) will appear. You can use T-BUG to recheck the memory addresses and insure that all is as it should be.

Completing the Service Tape

The recorder counter should

now be indicating the count for the end of T-BUG and the SYSTEM portion of your tape. On a 30 minute cassette there should be more than half the tape remaining for your BASIC programs.

Continue to advance the tape (10 to 15 counts) between programs, and add your BASIC routines to the Service Tape. I used the TRS-80 CLOAD command to get the routines into the computer and then used CSAVE to add them to the tape.

While RENUM is in the TRS-80, you may wish to change the line numbers of your routine to high numbers (20 000). This will allow you to CLOAD and merge your routines with other BASIC programs having lower line numbers.

You may also wish to make a list of program names, counter positions and SYSTEM entry points on your tape. Keep your list close to the TRS-80, as it will come in handy when your mind is preoccupied with other matters. ■

Disk Based Word Processor \$7.50

A complete word processing system for your TRS-80 including full editing features such as paragraph move, line deletion, insertion & line correction. Store text on disk, print business and personal letters, reports with numbered pages and title pages! Text stored on disk as blocks are created so texts are not limited by the available memory. The Pensa-Write word processor is for 16K single-drive TRS-80s and comes complete with software to produce upper/lower case at printhead, and keyboard reverse. Full right/left justification and much more. Send cheque, money order or order by phone, 24 hours, 7 days a week. Mastercharge and Visa welcome. Manual only, \$1.75-deductible from cost of software.

ORDER NOW! :

PENSADYNE

COMPUTER SERVICES

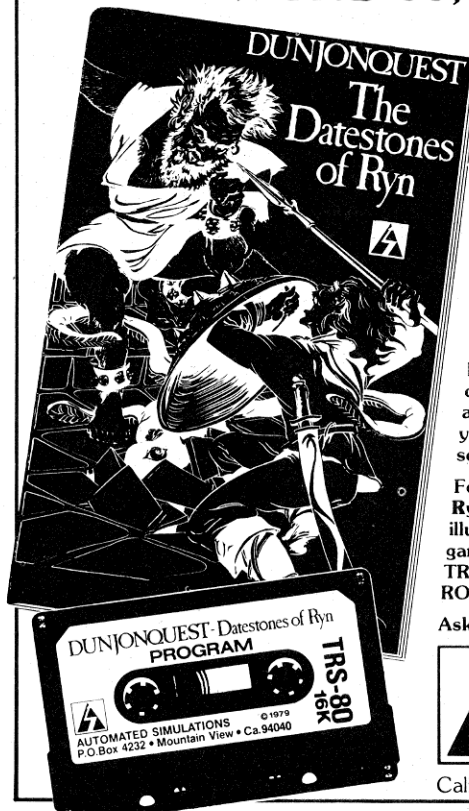
4441 WEST FIRST AVE.
VANCOUVER, B.C., V6R 4H9

604-224-3107

✓ 207



Try a Really Different Kind of Software for Your TRS-80, PET, or APPLE!



Cross swords with a band of dastardly robbers in their mountain lair in the **Datestones of Ryn**. You explore the caverns shown on your video display and vanquish the monsters in real time. You have just 20 minutes to recover the precious Datestones before time itself stops.

Monsters—Melees—Magic!

The **Datestones of Ryn** introduces you to the superlative DUNJONQUEST game system. Other games in the series may pit you against an evil wizard or the frightful insectoid monsters of the god Apshai. In the **Datestones** your main opponents are human, but look out for other nasty critters lurking in the darkness. You have 14 different commands ranging from moving (as fast or as slow as you like so long as you don't tire yourself out) to searching the walls for secret doors.

For just \$14.95 you get the **Datestones of Ryn** on cassette ready to play, and a superbly illustrated booklet that tells you all about the game. Please specify the version you want—TRS-80 (Level II, 16K), PET (16K old or new ROMS), or APPLE (32K Applesoft). ✓ 48

Ask your dealer or send today to:



AUTOMATED SIMULATIONS

Dept. R7
P.O. Box 4232
Mountain View, Ca. 94040



California residents please add 6% sales tax.

Need to use the memory occupied by KBFIX? Move it out of the way with this BASIC Program.

KBFIX Fix

C.W. Andreasen
P.O. Box 8306
Van Nuys, CA 91409

About six months ago I was bitten by the home computer bug and brought home a TRS-80. Now, I am very happy with my computer, even if it does have one shortcoming: keybounce.

Keybounce occurs when you type a letter once and find two or

three on the screen. This is very troublesome when you type LIST and get LLIST, because the system hangs up for lack of a printer.

When I bought my Level II machine, the software fix (KBFIX) was not available. Luckily I found someone who had both the KBFIX and a disassembler. He sent me a listing so that I could key in and make my own tape through TBUG.

The End of the Story

This might seem like the end

of the story, but two things happened. First I became dependent on the KBFIX routine, because I never cleaned the contacts on my keyboard, aggravating my keybounce. And secondly, I couldn't get to the RENUM routine.

RENUM and KBFIX are loaded in the same spot in memory, and you must use one or the other—not both.

After developing a fix for myself and finding that others shared this problem, I decided to share what I've learned about

relocating KBFIX.

This program is written in BASIC and allows the user to load in the machine language KBFIX program and relocate it to any place in memory desired. If you have TBUG, you can PUNCH out a new tape containing the relocated KBFIX as well as the other routine you want to run.

First determine where you want KBFIX to be located in memory. The instructions that come with your program tell you what to enter for memory size upon power-up. Take this number and subtract 54 from it. This is the new MEMORY SIZE you must enter to allow room for the relocated KBFIX directly below the other program, such as RENUM.

With RENUM a Level II 16K machine would read: MEM SIZE 31819. To run the program subtract 54, giving 31765 for the new MEM SIZE.

Load in, via SYSTEM, the normal KBFIX routine, which starts at 32713 (in the 16K machine). Execute it and load this relocation program. Type RUN.

The program asks you, "WHAT'S THE OLD STARTING LOCATION?", and you enter 32713. Then it asks, "WHAT'S THE NEW STARTING LOCATION?", and you enter 31765.

If you want a listing, type Y at the program prompt, and it prints a listing containing the memory locations and the decimal byte in each to the

```

10 CLS
20 PRINT "BEFORE RUNNING PROGRAM..... DID YOU ENTER THE"
30 INPUT "NEW STARTING LOCATION AS YOUR MEMORY SIZE"; C$
40 C$=LEFT$(C$,1):IF C$="Y" THEN 60
50 CLS:PRINT "YOU MUST TURN OFF POWER TO THE COMPUTER AND START AGAIN !!!":END
60 CLS:INPUT "WHAT IS THE NEW STARTING ADDRESS. IN DECIMAL"; S:SA=S
70 CLS:INPUT "WHAT'S THE STARTING POINT OF YOUR OLD KBFIX"; SP:PRINT
80 CLS:PRINT:INPUT "DO YOU WANT LISTING AT END (Y OR N)"; Y$
90 CLS
100 FOR L=SP TO SP+54
110 POKE(S),PEEK(L)
120 S=S+1
130 NEXT L
140 GOSUB 220
150 POKE(SA+37),NN:POKE(SA+38),NM
160 IF Y$="N" THEN CLS:GOTO 210
170 FOR X=SA TO SA+54
180 PRINT X;PEEK(X);
190 NEXT X
200 B$=INKEY$:IF B$="" THEN 200
210 PRINT:PRINT "TYPE /";SA;" AND PUSH ENTER":SYSTEM
220 NN=0:NM=0:Q=32768:P=128:N=SA+25
230 IF N-Q>=0 THEN NM=NM+P:N=N-Q
240 Q=Q/2:P=P/2
250 IF P>.5 THEN 230
260 P=128
270 IF N-Q>=0 THEN NN=NN+P:N=N-Q
280 Q=Q/2:P=P/2
290 IF P>.5 THEN 270
300 RETURN
  
```

Program Listing: KBFIX.

screen.

The program, starting at line 100 and ending at line 130, pokes at each memory location where KBFIX is located and pokes it with no changes into the new locations.

How the Program Works

As it turns out, only one instruction needs modification before the routine is able to run. There is one jump instruction that is not relative, and the two bytes giving the jump to address must be changed to reflect the

new location.

The subroutine starting at line 220 does this.

The subroutine figures the memory address of the 25th location, breaks that address down into two 8-bit words and assigns a decimal value to each 8-bit group. These two decimal bytes represent the upper and lower bytes of the new address that is to be jumped to, and this value is poked (at line 150) into the appropriate locations in the three byte jump instruction.

One interesting thing about

this jump instruction is that it is a JP P, nnnn. You will JUMP if the value is (flag) positive.

Perhaps you know a way to make this a relative jump. If it were relative, then the KBFIX program could be loaded directly into any location in memory without modification.

Line 160 makes the decision to print a listing or not. If NO is entered, the program goes directly to line 210 and prints "TYPE/(nnnn) and push ENTER". Variable (nnnn) is the decimal number to enter the KBFIX

routine.

The computer goes into SYSTEM and waits for you to type in the requested number. When the number is typed in and ENTER is pushed, you get "READY" on the screen, and the new KBFIX is active.

At this time you can input your RENUM or any other desired machine level routine and have KBFIX at the same time. You can, of course, type "NEW", get rid of the relocater program and use your TRS-80 as normal. ■

CENSUS CHECKER

The Census Checker system is a set of programs designed to check the accuracy of the 1980 census. The census will provide the population counts that will be used by all levels of government for the next ten years. If they are inaccurate and omit people, then your city or county will suffer. Revenue sharing, federal and state grants and future planning depend upon an accurate census. Census Checker can help.

The Census Checker is designed for the Radio Shack TRS-80 microcomputer and may be used on any other BASIC micro with BASIC and disk files. Small cities and counties will benefit most from the use of this system. The programs are straight forward and may be modified for special local problems.

For further information write:

MICRO DECISION SYSTEMS

3008 Redwood Ave.
Lakeland FL 33803 ✓186

Other government and census related micro software in development.

For Canadian * Owners

Lower Case Modification . . \$65.00
Cassette Load Modification . \$20.00
Radio Shack Numeric Keyboard
Installation \$50.00
(You supply numeric pad)

RS232C Serial I/O Port for Printer
etc. (Complete with connectors)
For Use With or Without Expansion
Box \$169.95

For a complete catalog and credit
vouchers worth \$25.00 on future
purchases send \$5.00 to:

*All Quotes in Canadian Funds

ORTHON COMPUTER
(ORTHON HOLDINGS LTD)

✓108 12411 Stony Plain Rd.,
Edmonton, Alta, T5N 3N3

TRS-80 users

Learn FORTH

FORTH is a structured high level language that dramatically cuts program development time. You can expand the FORTH language by defining new operations and data types. FORTH programs are compiled to reduce memory space and speed execution.

tinyFORTH is a complete version of the powerful FORTH language tailored to the TRS-80. The tinyFORTH system includes FORTH, a text editor, an assembler, graphics, and cassette I/O.

Learn FORTH on your own computer. The tinyFORTH user's manual contains hundreds of examples to teach you FORTH in a hands-on style.

tinyFORTH for 16k level II TRS-80:

Cassette and full documentation \$29.95
Documentation only \$ 9.95

All orders are fully guaranteed. And \$1.50 for postage and handling. Order with check, money order, Visa, or Mastercard.

Write for a FREE booklet describing FORTH.

The Software Farm ✓109

Box 2304 Dept. A18 Reston, VA 22090

TRS-80[®] EXCHANGE

Save on used TRS-80 hardware and peripherals. We buy and sell TRS-80 Level I's and II's, interfaces, disks, and printers. A limited warranty on this equipment is also available.

We also buy and sell used, original and complete Radio Shack disk software packages. Reg Trademark.

FOR A QUICK RESPONSE
CALL 203-669-0726

BUSINESS SOFTWARE CP/M and MODEL II COMPATIBLE NEWLY ENHANCED VERSIONS

Medical Mgmt System	\$495
Dental Mgmt System	\$495
Real Estate Multi-list	\$495
Insurance Agency Mgmt	\$495
Legal Time Accounting	\$495
General Ledger	\$495
Accounts Payable	\$495
Accounts Receivable	\$495
Payroll Processing	\$495
Inventory Management	\$495
Word Processing/Nad	\$495
Database Management	\$495
High-Speed Utility Sort	\$300
NEW! Latest CBASIC-2	\$ 99
NEW! Latest MBASIC 5.1	\$300
NEW! MBASIC Compiler	\$350
**CP/M 2.0 for model II	\$170
Complete Software Catalog	\$ 5
Complete Hardware Guide	\$ 5

UNIVAIR, INC. 314-426-1099
10327 Lambert Intl Airport
St. Louis, Missouri 63145 USA ✓234
Mastercharge/Visa Cards O.K.

EDUCATIONAL SOFTWARE

Level II—Min 4K

- ALPHA** For ages 4-7—teaches alphabet recognition; Reinforcement—a "happy" face
- SIGMA** For Grades 1-3—A random series of one-digit addition problems (i.e. $4 + 5 = 9$) Reinforcement—Push the puck through the goal

Simple to use—No depressing the ENTER key

Each \$5.95—Both for \$10.00



Mercer Systems Inc.
87 Scooter Lane
Hicksville, N.Y. 11801

✓104

If you have a lemon—make lemonade! How to improve your old CTR-41 recorder.

CTR-41 Modifications

Delmer D. Hinrichs
2116 S.E. 377th Ave.
Washougal WA 98671

Do you get tired of plugging and unplugging the remote cord to your cassette recorder?

Do you have trouble finding a program on a cassette after you've saved it? When you've found it, do you have trouble loading it?

When you've loaded it, do you forget to turn off the recorder, and get dips in your recorder's pinch roller?

If you have any of these problems, read on—they are easily fixed.

While there are several cassette control boxes available that will solve some or all of these recorder problems, they add to the clutter of wires and

units on your desk. Besides, it is much less expensive to fix the recorder itself.

Very little is required to fix your recorder. The materials and tools needed are listed in the Parts List. The materials come in packs of two each (if purchased from Radio Shack), so that two recorders can be fixed for the price of one, about \$.83.

If you have never worked with PC (printed circuit) boards, transistors or digital circuits, don't give up. Before I made these modifications to my CTR-41 cassette recorder, neither had I.

Manual Control

Disconnect the CTR-41 from all cords and place it on its face on a soft surface, perhaps a towel on the desk. Remove the five Phillips screws holding the back of the recorder. (Three screws are on the back and two are at the bottom of the battery compartment. Note that the battery compartment screws have a coarser thread.) Then gently lift the back and disengage it from the hi-low tone switch and the volume control. Did you remember to remove the dummy mic plug? When the back has been removed, the handle is free. The recorder will now look like Photo 1, except that it has not yet been modified.

Let's fix the recorder control problem first, so that we can manually control the recorder while the remote plug is in its jack. To make the electrical connections shown in Fig. 1, attach a SPST (single pole, single throw) switch across the two ter-

minals of the remote jack.

If the recorder is upside down with the keys towards you, near the upper right corner of the PC board there is an oval hole (see Photo 1 and Fig. 2). Near this hole is a solder terminal with a yellow wire attached and one without. Attach the manual switch to these terminals and to an LED (light emitting diode) and its current-limiting resistor.

Be sure that the LED is attached with the proper polarity or it won't light up.

To attach the switch to the recorder's case, drill three holes in the case, as shown in Photo 2.

File the larger center hole into a rectangular shape to accommodate the movement of the sliding switch. The two smaller outer holes are for the switch screws. Drill another hole for the LED near the switch in the recorder case.

Now we can solder the switch and the LED to the two terminals using short lengths of hook-up wire. It works best to solder the wires to the switch, install it and then solder the other ends of the wires to the terminals. Be sure that there is room to install the switch (I had to remove some additional plastic material from flanges inside the case). The LED may be secured in its hole with a drop of one of the "super glues."

The remote plug can now be left in its jack. In one position (closed), the switch allows normal manual control of the cassette recorder; in the other position (open), the computer has

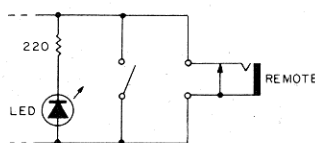


Fig. 1. Electrical connections for the manual switch and for the LED signal light.

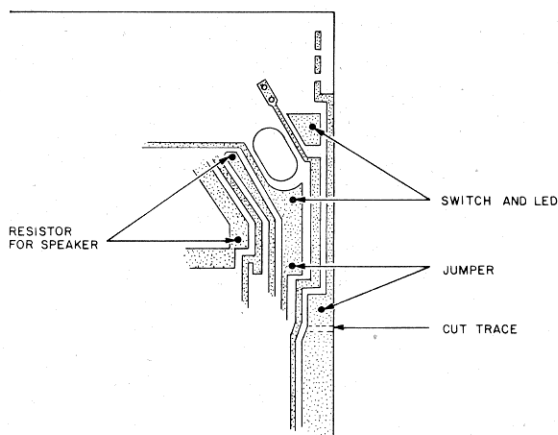


Fig. 2. Upper right corner of the recorder's PC board, showing connection points and the ground trace cut.

Parts List

- 1 - Subminiature SPST slide switch
RS#275-406 2/59
- 1 - Subminiature LED (1/8" dia.)
RS#276-042 2/69
- 1 - 220 ohm, 1/2 watt resistor at Radio Shack 2/19
- 1 - 22 ohm, 1/2 watt resistor at Radio Shack 2/19
- Rosin core solder
- Insulated hook-up wire
- "Super Glue"
- Phillips screwdriver (small, for #2 screws)
- Soldering iron
- Sharp knife
- Electric drill and bits
- Square file (small)

TRS-80™ USERS STOP!!!

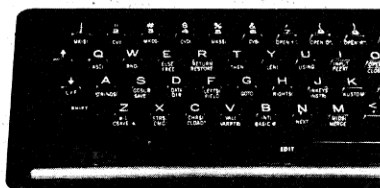
WE'VE DONE IT AGAIN! MORE QUALITY ACCESSORIES STARTING WITH TSHORT+! LVII & DOS SUPER SHORTHAND.

NEW! NOW! WEB'S FAMOUS TSHORT™ EXPANDS!

SAVE MORE TIME THAN EVER... TYPING PROGRAMS WITH TSHORT+™!

Look at these new Features:

- NOW! 41 preprogrammed LV II and DOS statement keys.
- NOW! 11 "SAVEABLE" /KUSTOM keys: Ten 10-character and one 64-character.
- NOW! Includes automatic keyboard DEBOUNCE.
- NOW! RELOCATABLE. Less than 1 K bytes of machine language in low or high memory.
- NOW! Available on formatted DISKETTES for 2 or more drives. Comes on cassette for LV II and single disk drives.
- Hold "SHIFT" or "CLEAR" and press desired key — entire statement is typed on

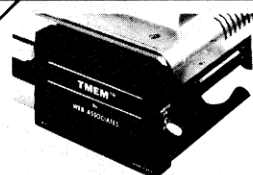


TRS-80 Keyboard with decals installed.

- screen. Installed "CTRL" key can substitute for "SHIFT"
- Complete decal set (see picture) included for both LV II and DOS systems.
 - Features self-entering commands, i.e. CONT, GOTO10, KUSTOM.
 - Automatic Close Paren. ")" may be programmed in KUSTOM.

TSHORT+ cassette w/ instruction manual \$ 19.95
TSHORT+ formatted DISK version + manual \$ 24.95

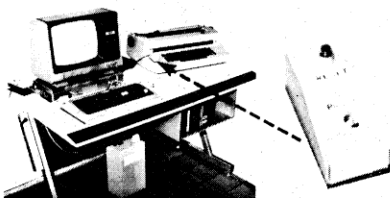
NEW!



TMEM™

Now, the best of both worlds! A battery supported memory giving you READ/WRITE capability with ROM security!

- Use for retaining important totals/variables, utility/system software (i.e. TSHORT, TLEC), development programs, monitors, etc.
 - User programmable. Write enable switch + OUT statement ensures memory security.
 - External plug-in module. Available in either 1K or 2K.
 - Retains memory contents on power down or failure for 2 weeks or more. Built-in Batteries recharge automatically.
 - Instant access to memory contents upon power up.
 - Uses unassigned area of memory. No conflicts with other operating software.
 - Compatible with either LVII or Disk Operating System. (Special cable required for LV II)
- TMEM w/1K \$124.95
or
TMEM w/2K \$174.95



TSEL™

We'll convert YOUR IBM Selectric I or II to a high quality letter printer, totally compatible with your TRS-80.

- μ p control — 512 character buffer.
- Special TRS-80 cable with custom "Pause", "Reset" switches. Our optional "Y" cable allows it to be plugged in with other printers.
- A superior word processing system.
- Compatible with Electric Pencil™ or Radio Shack's Scripsit™ Patches or modifications not required.
- Completely tested and ready to LPRINT. TSEL (cleaning and minor service included) \$795.00 (Options and shipping extra — call or write for special shipping instructions).

TBEEP 1™

For Level II and Disk Users — A self-contained audio alert beeper with a pager-like tone. Plugs in-line with "AUX" cable from your TRS-80 (Requires 9V Battery) \$ 19.95

NEW!



TBEEP 2™

A TBEEP kit you install inside your TRS-80 keyboard.

- Completely assembled and tested.
 - Attach to keyboard's PC board with double-sided foam tape (included) and solder three wires to easily located points on keyboard unit. Installs in minutes.
 - Uses power from your TRS-80. No battery required.
 - **DEALERS!** Install when modifying your customer's TRS-80, and include TBEEP's simple four word BASIC command in your off the shelf Software.
- TBEEP 2 Kit (with complete instructions) \$ 12.95

TBASE™/TCHAIN™

2 powerful winners coming up. Watch our ads for release.

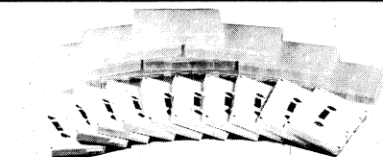
NEW!



TLEC™

Kit interfaces your IBM Electronic 50/60 to your TRS-80

- Kit includes Cable with Custom control switches for "Pause" and "Reset" and cassette with operating Software.
 - Installs in minutes. Plug it in, no wire to cut or solder. Does not disturb IBM warranty.
 - Needs no modifications or patches to popular word processing software.
 - Requires either 1K TMEM or 2K TMEM. Load only once and forget it.
- TLEC w/1K "TMEM" (with complete instructions) \$239.95
TLEC w/2K "TMEM" (with complete instructions) \$289.95



TPAK™

The best cassette tapes money can buy — AGFA 611. We use them for our production software, such as TSHORT™ Pack of 10 C-10 blank tape cassettes, boxes, and blank labels \$ 12.95



Telephone Orders:
(714) 559-6249

PLEASE NOTE: All WEB Associates' products are designed to work with Level II and Disk Operating Systems unless specified otherwise.

Send Check or Money Order to:

WEB ASSOCIATES ✓27

P.O. Box 60 QD, Monrovia, CA 91016
(California Residents add 6% tax)

DEALER INQUIRIES INVITED

UPS/C.O.D. — ADD \$3.00

FOREIGN ORDERS:

Add 20% (\$10 maximum)

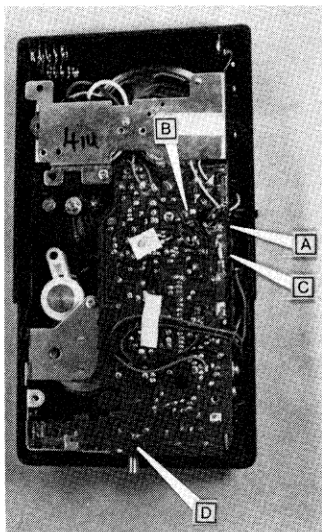


Photo 1. Modified CTR-41 cassette recorder with the back removed.

- a. Manual switch and LED connection points.
- b. Speaker resistor.
- c. Ground loop jumper
- d. Tone switch (optional manual switch).

control. The LED will light up when the switch is in the computer control position and during play or record. The LED signals when the recorder is ready for computer control and when a computer-controlled operation has been completed. After a completed operation, the recorder should be turned off with the stop key to avoid pressing dips into the pinch roller.

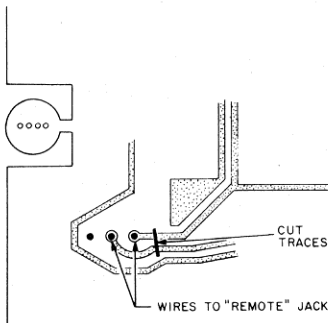


Fig. 3. Lower left corner of the recorder's PC board, showing trace cutting and the connection points for optional use of the tone control switch as the manual switch.

If you prefer, a manual control switch can be installed without cutting into the recorder's case: Just use the hi-low tone control

switch. Since this switch is not used when recording or playing programs or data, it may be disconnected and used as a manual switch. At the lower left corner of the recorder's PC board, just above the tone switch, are the two adjacent solder terminals of this switch (see Photo 1 and Fig. 3).

Cut the two PC board traces to this switch with a sharp knife, then solder hook-up wire from the switch terminals to the two terminals for the remote jack (by the oval hole in the PC board). In hi we now have computer control, and in low, manual control.

Sound

Now that we have full manual control of the recorder's tape movement, how do we find the program or data that we want? If we zero both the tape counter and the tape cassette before starting, the counter's reading will give an approximate location for the start of a program or data set. However the counter does not give an exact location on the tape, and if we start reading from the tape a little too early or a little too late, we may not be able to read from the tape at all.

Missing the recorded leader to the program, or starting to read before the end of the previous program will cause read failure.

How can we tell exactly where we are on the tape? By listening! Inserting the ear plug normally turns off the speaker. Bypassing this built-in switch allows us to hear the data as it is being read. By listening to the tape in manual play mode, we can tell exactly where the program or data that we want begins. In addition, by listening to the tape as it is being read by the computer, we can tell if the volume level has been set too high or too low and adjust it accordingly (different brands of tape require a different volume setting).

Listening to the tape as it is being read also allows us to detect excessive hum, mushiness, dropouts, etc., that sometimes cause read or verify failures.

Connecting a resistor as shown in Fig. 4 allows us to hear

all programs or data being read by the recorder, or being recorded. Though I used a 22 ohm resistor, you may wish to use a larger resistor, say 47 ohm or 100 ohm, so that the sound of the data transfers isn't so loud. A resistor is necessary to avoid diverting too much energy to the speaker and not enough for the computer or the recording head.

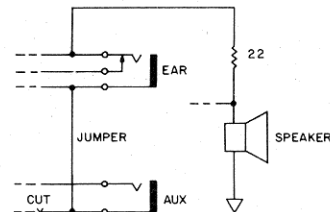


Fig. 4. Electrical connections for the ground loop jumper and for the speaker resistor.

This resistor is soldered between two terminals on the recorder's PC board as shown in Photo 1 and Fig. 2. Be sure that the resistor leads do not touch any other solder terminals and that the resistor is pressed close to the PC board so that the back of the recorder's case will still go on.

Listening to the tape also enables us to record an audio title or description prior to any program or set of data. Remove the dummy plug in the mic jack, put the recorder in manual record mode, and speak into the built-in microphone.

Having the speaker and the microphone active at the same time (due to the added speaker resistor) may cause some feedback or ringing, but it is usually

not serious. Take care that the computer does not read one of these audio recordings or it will become confused.

Ground Loop

Now that we hear the programs or data being read by the computer, the excessive hum of the ground loop problem becomes noticeable. The ground loop occurs because the CTR-41 was never intended to have both auxiliary and ear jacks plugged in at the same time. Each is grounded at different places in the circuit. With two different ground circuits and an AC (alternating current) power supply, it is easy for the two grounds to have a small AC voltage between them. The result is 60 hertz hum. This hum is added to the signal before it is recorded on the tape, and is added again as it is read from the tape. Is it any wonder that we sometimes have trouble correctly reading programs or data from tape?

The solution is simple, as shown in Photo 1 and Fig. 4: Cut the recorder's PC board ground trace to the auxiliary jack and connect its ground directly to the ear jack's ground with a jumper wire. This jumper is located on the right edge of the PC board, directly over the auxiliary and ear jacks, as shown in Photos 1 and 2, and in Fig. 2. This completes the modifications.

Conclusion

Now, reassemble the recorder. Place the handle in position (sharp edge towards the front of the case), gently position the back of the case over

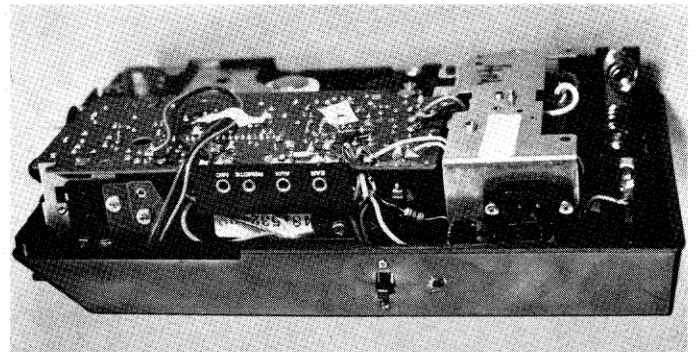


Photo 2. Side view of the modified CTR-41, showing manual switch and LED.

the tone and volume controls, and replace the five Phillips screws (coarse-threaded in the battery compartment). The only visible changes are the switch and the LED (Photo 3). However the system is now much easier and more pleasant to use.

Recent TRS-80's have been delivered with a CTR-80 cassette recorder instead of the CTR-41 discussed here. The CTR-80 allows fast forward and rewind without unplugging, and I understand that it has the ground loop problem fixed. To

find the start of a program, or to start recording at a specified counter number it would still require installation of a switch to allow manual control of play and record.

Also, the manual record is needed for audio messages or to blank out the remaining bits and pieces of previously recorded programs or data. If left on the tape these can cause reading problems. The CTR-80 should also require the added resistor to allow listening to the data flow. ■

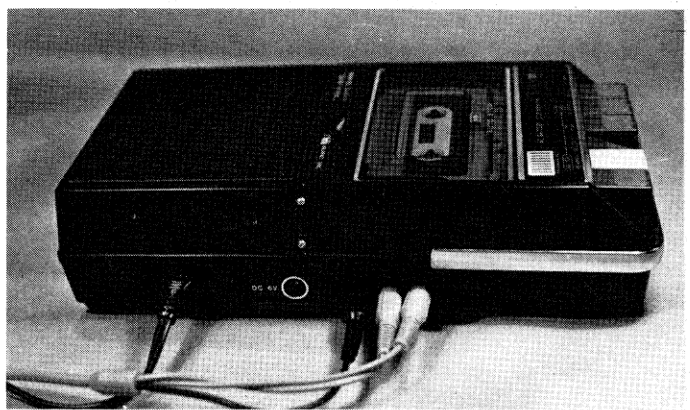


Photo 3. Modified CTR-41 in use.

BUSINESS/ACCOUNTING SOFTWARE

Flexible client write-up/general ledger system designed by a CPA and developed by a computer specialist for CPA's, accountants and general businessmen provides large-scale computer features at micro-computer software costs:

- * designed for use by present employees
- * allows for up to 500 accounts
- * departmental financial statements including budgets
- * retains standard journal entries
- * automatic balancing of transactions
- * fast entry & posting of transactions
- * easy to follow audit trail
- * conventional accounting symbols used

For 9-program package on diskette with user manual send \$495 to:

TASK COMPUTER APPLICATIONS
Dayton, Ohio PO Box 24001
45424
(513) 233-2118 ✓ 147

COVER YOUR INVESTMENT

• Cloth Backed Naugahyde Vinyl
• Improved Reliability
• Longer Life

• Waterproof & Dustproof
• Three Decorator Colors
Saddle Tan • Electra Blue • Black

TRS-80 MODEL II Keyboard Only \$22.95 Keyboard Only \$7.95	TRS-80 MODEL I Keyboard \$4.95 Cassette \$4.95 Under Display \$4.95 Package Offer 16.95 Note: Add \$2.00 for EXPANSION INTER	TRS-80 MODEL II Full Apple II \$12.95 Apple II Keyboard \$9.95 Apple II Disk \$3.95	TRS-80 MODEL I Keyboard \$4.95 Cassette \$4.95 Under Display \$4.95 Package Offer 16.95 Note: Add \$2.00 for EXPANSION INTER	TRS-80 MODEL II Full Apple II \$12.95 Apple II Keyboard \$9.95 Apple II Disk \$3.95	TRS-80 MODEL I Keyboard \$4.95 Cassette \$4.95 Under Display \$4.95 Package Offer 16.95 Note: Add \$2.00 for EXPANSION INTER	TRS-80 MODEL II Full Apple II \$12.95 Apple II Keyboard \$9.95 Apple II Disk \$3.95	TRS-80 MODEL I Keyboard \$4.95 Cassette \$4.95 Under Display \$4.95 Package Offer 16.95 Note: Add \$2.00 for EXPANSION INTER
--	---	--	---	--	---	--	---

Send check or money order to:
Include \$1.00 for postage and handling.
Overseas orders include \$3.00 postage.
DEALER INQUIRES INVITED

COMPUCOVER ✓ 100
P.O. Box 324 (Dept. C)
Mary Esther, FL 32569
Phone (904) 243-5793

MISOSVS: serious software (tm)

MACHINE LANGUAGE PROGRAMS FOR YOUR TRS-80 (*)

- TUTIL** An all purpose utility for the tape user. Examines, clears, initializes, moves, and modifies data in memory. Compare two blocks or search for up to 24 bytes of string (HEX or ASCII). Punch, load, verify, or execute 280 programs. Registers are displayed and changed in English. Jump and set 2 breakpoints. Output to Printer and CRT simultaneously. TUTIL also provides a MODIFY program that remodifies the IOPROM (strips I/O routines, relocates variable list, & re-references all pointers) to provide superior method of assembly language programming for the tape user. (16K, 32K, & 48K; all three for \$200)
- DISKMOD** All features of TUTIL plus read & write disk sectors, even to the DISKCONTROL! Read entire tracks including address marks. Scroll through the disk sector by sector. (16K, 32K, & 48K; all three for \$200)
- DISASSEMBL** Turn your Editor/Assembler into a DISK package. This patch modifies EDITASM 1.1 & 1.2 under DOS, NEWDOS, or VTOS. Capabilities? You couldn't ask for more! Add full disk I/O (source and object code), block move, global change, pagination with optional end-of-line prompting, sorted symbol table, print text buffer utilization, corrected DPM expansion, protect memory, and recover after boot. From within the modified EDITASM, you will have DIR, FREE, and FILE. This package is a must for assembler programmers. A 32K system is required to run this patch. (16K & 32K; both for \$150)
- DISASSEMBL** *NEW Version 2.0 - Output to HEX & PCH* Complete your assembly language tools with this disassembler. 2-passes provide SYMBOLS, EQUATES, and ORG. Output to CRT, Printer with paging, or tape cassette. The tape loads into Editor/Assembler. Relocate or modify machine code programs that you purchase. (16K & 32K; both for \$150)

MISOSVS Ver. 9
5904 Edgehill Dr.
Alexandria, VA 22303
703-968-2998 (5p-11p)

✓ 221

✓ 100

✓ 100

5 COMPLETE STORES IN ONE!

COMPUTER CENTER

features a complete line of

SOFTWARE and BOOKS

for the

TRS-80

write for information

DigiByte ✓ 222
SYSTEMS CORP.

31 EAST 31st STREET
NEW YORK, N.Y. 10016
(212) 889-8130

MAXELL®

OR SCOTCH® BRAND DISKS

Some computerists pay less but may not get Shugart® or IBM® approved disks.

8" SINGLE SIDE - DOUBLE DENSITY
Box of 10 FOR \$50.00

8" DOUBLE SIDE - DOUBLE DENSITY
Box of 10 FOR \$65.00

5 1/4" MINI — Box of 10 FOR \$40.00

NEW DYSPAN® DISKS

5 1/4" Mini - Box of 5 for \$25.00

COD \$1.00 Additional — Specify (8" - Soft or Hard Sector) (5" - Soft or Hard Sector)

CUSTOM ELECTRONICS INC. ✓ 121
238 EXCHANGE STREET
CHICOPEE, MASS. 01013
EST. 1960 1-413-592-4761
HOURS: Tues. to Sat. — 9 to 5
• ATARI • • TI/99 • • MATEL •

SPEEDUP BOARD

TRS-80 REVERSE VIDEO

SPEED MOD — You don't have to spend \$3,500 on a TRS-80 Model II to get faster computing. Now you can speedup your Level II TRS-80 - Disk systems included! — by up to 100% (50% guaranteed) with our speedup board. The result is more animated graphics, shorter program run times, and generally far greater computing power for your dollar. Change between normal and faster operation by using a simple BASIC statement. The contents of memory are not affected by speed changes and a switch is not required (a switch may be installed if manual speed select is desired). Changes are provided for NEWDOS, DOS 2.2, and DOS 2.3 that allow disk systems to run reliably at both the normal and accelerated rate. Buy the most versatile, easiest to install, and most publicly recognized speed mod on the market today.

ASSEMBLED & TESTED \$24.95

REVERSE VIDEO is finally here! If you're tired of going blurry-eyed looking at your video display, then you are ready for reverse video. It provides dark black characters and graphics on an all white screen for a much crisper and much easier to read presentation. Change between normal and reverse by simultaneously pressing a combination of three keys on the keyboard.

ASSEMBLED \$14.95
Add 5% for postage and handling
California residents add 6% sales tax ✓ 122

Bill Archbold Electronics
Dept 80 • P.O. Box 7123 • Sacramento, CA 95826
(916) 362-3627

Use your 16K Level II to keep track of up to 300 articles in your magazine collection.

Magazine Index

William Klungle
1820 W. Lakewood
Holland MI 49423

dles up to 300 files at a time. It creates, corrects, lists, stores and most importantly, SEARCHes the file for the information requested. The program requires a TRS-80 Level II computer with 16K memory and a recorder.

The listing reproduced here has been typed with spaces between the statements for clarity. When entering the program, remove all spaces from between the statements or there will not be enough memory available to run the program.

Subroutines

Before describing its operation, some program subroutines should be explained.

Subroutine 480 is used in several sections to print a formatted data record onto the display screen.

Subroutine 490 is the list printing header, used to clear the screen, set the line counter (L) and format the screen for the print list.

Subroutine 1000 is used by the entry section to position the cursor at particular locations on the display. This routine retains the screen printing format in spite of errors or corrections. Statement CHR\$(28) will return

the cursor to position 0-0 (upper left corner) of the screen. The cursor position (P) is supplied by the program before this subroutine is called. Statement CHR\$(26) provides one line feed for each execution of do-loop "I".

Subroutine 1100 provides a warning indicator of entry errors by printing * ERROR * at the far right of the line in error. This

subroutine is called by the error checking located after each entry line of the program.

Subroutine 1200 is a print formatting routine used by the Correction section of the program to print the current record data in the proper screen position before the entry section makes corrections.

Subroutine 1300 is used by both title and subject Search

Terrific! Now that I have finally saved enough money to add a printer to my system, I can't find the *Microcomputing* articles on printer evaluations. It seems as though I just read one of them last week. Now what issue was that in?

After several such search sessions of looking through back issues of magazines for information which I only vaguely remembered, I realized my computer's was made for this job.

At last, a chance to prove to my wife that this computer system is not just an expensive toy, but a useful household appliance!

The following program han-

Program Listing

```

1 REM: MAGAZINE INDEX PROGRAM 7/15/79
2 REM: BY WILLIAM KLUNGLE - FOR TRS-80 LEVEL II, 16K MEM
5 CLEAR1000:DIR$(300):XS=" " :NS="MAGAZINE"
10 CLS:PRINTNS;" INDEX":PRINT:PRINT" 1 = KEYBOARD ENTRY":PRINT" 2 = RE
AD DATA TAPE":PRINT" 3 = CORRECTIONS":PRINT" 4 = PRINT LIST":PRIN
T" 5 = DATE SEARCH":PRINT" 6 = TITLE SEARCH":PRINT" 7 = SUBJECT S
EARCH":PRINT" 8 = STORE DATA ON TAPE":PRINT" 9 = EXIT"
15 ONERRORGOTO10:PRINT:E=1:INPUT"SECTION ":S:ONGOTO100,200,300,400,50
0,600,700,800,900:GOTO10
100 IFLEN(R$(E))>1THEN125ELSECLS:PRINT"NEW ENTRY RECORD #":E;" (0=R
ETURN)":TS="":SS="
105 P=3:GOSUB1000:INPUT"ISSUE DATE (02/79) ":DS:IFDS="0"THEN10ELSEI
FDS="DELETE"THEN305ELSEPRINTTAB(22);CHR$(27);" ":DS:IFLEN(DS)<>5
THENGOSUB1100:GOTO105
110 P=4:GOSUB1000:INPUT"TITLE (20 MAX) ":TS:PRINTTAB(22);CHR$(2
7);" ":TS:IFLEN(TS)<LORLEN(TS)>20THENGOSUB1100:GOTO110
115 P=5:GOSUB1000:INPUT"SUBJECT (12 MAX) ":SS:PRINTTAB(22);CHR$(2
7);" ":SS:IFLEN(SS)<LORLEN(SS)>12THENGOSUB1100:GOTO115
120 P=7:GOSUB1000:INPUT"MORE ENTRIES (Y-N-E)":YS:IFYS="N"THEN120ELSEI
FY$="E"THEN105ELSETS=TS+XS:SS=SS+XS:RS(E)=LEFT$(DS,2)+RIGHT$(DS,2)
+LEFT$(TS,20)+LEFT$(SS,12):IFY$="N"THEN10ELSEIFY$="Y"ANDS=3THEN30
0
125 E=E+1:IFE>300THEN700ELSE100
200 CLS:PRINT"READ DATA TAPE":PRINT:PRINT"SET TAPE TO READ ('PLAY') DA
TA.":INPUT"ENTER' WHEN READY. ....(0=RETURN) ":YS:IFY$="0"THEN10
ELSEINPUT$-1,NS:E=1:PRINT#306,NS;" DATA READ IN PROGRESS."
205 PRINT#530,"READING FILES ":E;"-":E=5:INPUT$-1,RS(E),RS(E+1),RS(E+
2),RS(E+3),RS(E+4),RS(E+5):IFRS(E+3)=""ANDRS(E+4)=""ANDRS(E+5)=""
THEN10ELSESE=E+6:IFE>300THEN10ELSE205
300 CLS:PRINTNS;" CORRECTIONS (COMMANDS: 0=RETURN, 'DELETE')":PRI
NT:INPUT"CORRECT FILE #":E:IFE=0OR(E)>300THEN10ELSEIFLEN(R$(E))<1
THEN300ELSEDS=LEFT$(RS(E),2)+"/"+MID$(RS(E),3,2):TS=MID$(RS(E),5,
20):SS=MID$(RS(E),25,12):GOSUB1200:GOTO105
305 IFS<>3THEN10ELSERS(E)=""GOTO300
400 E=1:GOSUB490
405 IFR$(E)=""THEN410ELSEGOSUB480:IFL=14THENPRINT#990,"C=CONTINUE, P=
FINISH ":INPUTY$:IFE>300ORY$="F"THEN10ELSEGOSUB490:GOTO405

```


sections of the program. This routine attempts to match a requested group of characters with the record currently being addressed. If a match is found, the routine causes subroutine 480 to print the current record on the display.

When the RUN command is entered, the program begins execution at line number five. This program line clears (sets aside) 11000 bytes of memory for string data storage. Most of this space will be used by the data array (R\$) in which the file records are to be stored. Variable N\$ is set to the title MAGAZINE and X\$ is set to 20 blanks. X\$ will be used by the program to format the file records. Array R\$ is also dimensioned at this time to handle 300 records.

Program Operation

Program lines 10 and 15 are the selection menu. The ON ERROR statement safeguards against an unusual error or data read error which would otherwise terminate the program and result in a loss of data. Line 100 is the beginning of the new entry section. This line checks the record being addressed for data. If the record is empty, the next entry is placed in the empty record. This routine allows deleted records to be automatically filled when new entries are made to the file. This line also clears the

screen, prints the current record number and clears (nulls) both title and subject variables. Program line 100 is only executed for New Entries.

Lines 105 through 125 input data for the New Entry and the Correction sections. P designates the cursor position at which a particular input request is to be printed. Subroutine 1000 positions the cursor. The length of each entry is checked to be sure it conforms to the record size requirements and error routine 1100 is called if necessary.

The Issue Date variable (D\$) may be reentered by pressing ENTER. Since the date variable is not nulled, it need only be entered when a change is necessary. The contents of that variable are printed in position over the entry for confirmation.

Program lines 200 through 205 constitute the tape reading section. This section allows the operator to prepare the tape for the data read, reads the file name (N\$) and then reads six records at a time. Before returning to read additional records, the program checks the contents of the last three records. If these records are blank, the program assumes that the end-of-data has been reached and returns to the selection menu.

Program line 300 accesses individual records for correction. If the record (E) requested for

correction is empty, the program returns to line 300 to ask for another record number. If the requested record contains data, the record is divided into the data, title and subject variables of D\$, T\$ and S\$. Subroutine 1200 prints the contents of the variables on the screen.

The program is then directed to the entry section (105-125). When the entry section is accessed through the correction routine, the variables will not be cleared. Entering only a return will permit the operator to skip by entries which do not require change. If a new entry is made, the variable will be changed to reflect the correction. After each entry, the data in the variable is printed on the proper position for verification.

Program line 305 is used only when a delete is attempted. If it is not entered from the correction section, the delete will be rejected and the program returned to the menu section.

Lines 400 through 410, along with subroutines 480 and 490, provide a formatted listing of the records in the file. A maximum of 14 records can be displayed on the screen at one time before the interrupt routine in line 405 allows the operator time to read the display and choose whether to continue the printing or return to the selection menu.

Issue Date Search

The Issue Date Search section consists of lines 500 through 510. Since the / entered with the data is not stored in the file, the search date requested must also have the / removed. If the current record date matches the date requested, the record contents will be printed on the display by subroutine 480. This section will also allow only 14 lines to print on the display before interrupting for an operator decision.

Lines 600 through 610 search the file for a character sequence. A search request can include up to 20 characters; shorter entries require more search time. The variable B is set to the beginning position of the Title within the record (5). Variable IN is set to the Title length (20 positions).

Subroutine 1300 checks the

requested character group against the record. If a match is found, the data is printed on the display by subroutine 480. The search can be suspended at any time the operator enters an S. This interrupt allows the operator to exit the search routine if the required record is found before the display has been filled.

Program line 700 allows the subject section of the file to be searched for a particular character sequence. Variable B is set to 25, the beginning of the subject section of the record and variable IN is set to 12, the length of the maximum number of subject characters. Program lines 605 and 610 are used to search the file as described above.

Program Termination

Lines 800 through 810 store the data. A name for the file is requested; if you have no name ('ENTER' only) the title Magazine will be entered automatically. Line 810 writes six data records on the cassette at a time. The last three records are checked for data — if these are empty the program assumes the end-of-data has been reached and returns to the selection menu. If any of the last three records contain data, the record counter is indexed and the program returns to line 810 to continue storing data.

Program line 900 provides a last chance to save data before the program terminates. If the operator requests Exit Program, line 900 will provide a reminder that the data in the array will be lost when the program terminates. If the operator responds with anything but YES to the question, "Has the data been stored?", the program will call the data storage section.

This versatile program can be adapted to various types of material and uses. If the record size is changed, keep in mind that the maximum number of characters which can be written to tape in one PRINT#—1 statement is 256. The computer will cut off any characters over this amount without warning. If the record size is increased, the number of records stored per PRINT#—1 statement must be reduced. ■

```

410 E=E+1:IFE<301ANDL<14THEN405ELSEPRINT#990,"C=CONTINUE, F=FINISH";:I
      NPUT " ";YS:IFY$="F">ORIG>300THEN10ELSESEL=0:GOSUB490:GOTO485
480 PRINT#TAB(10);MID$(R$(E),5,20);TAB(35);MID$(R$(E),25,12);TAB(55);
      LEFT$(R$(E),2)+"/";MID$(R$(E),3,2):L=L+1:RETURN
490 CLS:PRINT"REC ";TAB(20);"TITLE";TAB(30);"SUBJECT";TAB(55);"ISSUE"
      :PRINT#L=2:RETURN
500 CLS:PRINT#S;"ISSUE SEARCH BY DATE (0=RETURN)";PRINT:INPUT"ENTE
      R SEARCH DATE (02/79) ";:DS:IFD$="0"THEN10ELSEIFLEN(D$)<>5THEN5
      00ELSEDS=LEFT$(DS,2)+RIGHT$(DS,2):E=1:GOSUB490
505 IFELEFT$(R$(E),4)=D$THENGOSUB480
510 E=E+1:IFE<301ANDL<14THEN505ELSEPRINT#990,"C=CONTINUE, F=FINISH ";
      :INPUT " ";YS:IFE>300ORY$="F"THEN10ELSEGOSUB490:GOTO505
600 CLS:PRINT"SEARCH ";NS;" FILE FOR TITLE (0=RETURN - S=STOP SEA
      RCH)";PRINT#B=5:IN=20:E=1:INPUT"ENTER SEARCH TITLE (20 MAX) ";
      :TS:IFTS="0"THEN10ELSEIFLEN(T$)<10LEN(T$)>20THEN600ELSEGOSUB490
605 Y$=INKEY$:IFY$="S"THENL=14ELSEZ$=MID$(R$(E),B,IN):GOSUB1300:IFI=0T
      HEN610ELSEGOSUB480
610 E=E+1:IFE<301ANDL<14THEN605ELSEPRINT#990,"C=CONTINUE, F=FINISH ";
      :INPUT#YS:IFE>300ORY$="F"THEN10ELSEGOSUB490:GOTO605
700 CLS:PRINT"SEARCH ";NS;" FILE FOR SUBJECTS (0=RETURN - S=STOP S
      EARCH)";PRINT#B=25:IN=12:E=1:INPUT"ENTER SEARCH SUBJECT (12 MAX)
      ";:TS:IFTS="0"THEN10ELSEIFLEN(T$)<10LEN(T$)>12THEN700ELSEGOSUB
      490:GOTO605
800 CLS:Y$="":PRINT"STORE ";NS;" DATA ON TAPE (0=RETURN)";PRINT:PRI
      NT"SET RECORDER TO PRINT ('RECORD') DATA....";INPUT"ENTER NAME O
      F DATA FILE ";:YS:IFY$="0"THEN10ELSEIFLEN(Y$)>0THENN$=Y$
805 CLS:E=1:PRINT#130,"STORING ";NS;" DATA ON TAPE:PRINT:PRINT#-1,NS
810 PRINT#390,"WRITING FILES #";E;":E+=1;PRINT#-1,R$(E),R$(E+1),R$(E
      +2),R$(E+3),R$(E+4),R$(E+5):IFR$(E+3)=""ANDR$(E+4)=""ANDR$(E+5)=""
      THEN10ELSESE=E+6:IFE>300THEN10ELSE810
900 CLS:PRINT#TAB(20);"WARNING ";PRINT:PRINT"WHEN THE PROGRAM TERMIN
      ATES, ALL DATA WILL BE LOST!";PRINT:INPUT"HAS DATA BEEN STORED ON
      TAPE ";YS:IFELEFT$(Y$,1)<>"Y"THEN800ELSEEND
1000 PRINT#CHR$(28);:FOR I=1 TO P:PRINT#CHR$(26);:NEXT I:RETURN
1100 PRINT#TAB(55);CHR$(27);" ERROR ";:RETURN
1200 CLS:P=3:GOSUB1000:PRINT#TAB(24);D$:PRINT#TAB(24);T$:PRINT#TAB(24);S$
      :RETURN
1300 FOR I=1 TO LEN(Z$)-LEN(T$)+1:IFT$=MID$(Z$,I,LEN(T$)):RETURN
1305 NEXT I:I=0:RETURN

```

*Paper burns and scissors melt . . . or is it
rocks cut paper? Play the game in less than 4K.*

Rock, Scissors, Paper

Dodd Harris
11524 Shelbyville Rd.
Louisville KY 40243

Remember playing "Rocks, Scissors, Paper" when you were a kid? Saying "one, two, three," you and your opponent would throw out two fingers, a fist or all five fingers and chant: "Rock crushes scissors!" (or whatever the result was).

Introduction

I decided to write a program to play this game for several reasons. First, I wanted to program a game that I hadn't already seen done. Second, I wanted to program a game with some not-too-difficult graphics included (after all, I've only been programming for four months). I wanted to avoid a game with all words on a screen.

In fact, this game plays as nearly like its real-life counterpart as the computer can. (Yes, I've played Lunar Lander and, for all I know, it may be completely lifelike, but how can I tell?) I think the pictures enhance the way this game plays because watching them appear quickly takes the place of

watching a human opponent to see what he's done.

Third, I wanted a game that would appeal to my kids and get them involved with operating the computer, getting used to it and losing any hang-ups about its being hard to use. They love this game! From their playing with the machine, I hope they'll move naturally toward becoming curious about how to make it do things (read, program it) themselves.

After all, when my kids have grown up, these machines are going to be as common as telephones, and I don't want them to be technological savages.

It seems to be working! My youngest (aged eight) loads programs from tape, gets set up and plays games as matter-of-factly as she turns on the TV. She also is asking questions such as: "How does it do that?" (Success!)

My son, aged ten, is a little further on. He likes to program, but the only statement he's mastered is PRINT. He thinks making the machine display endless lists of his favorite rock stars is a programming feat just short of evaluating multiple

integrals in Tiny BASIC. Ah well, give me time. Maybe if I teach him about conditional branches.

The fourth goal I had for this program—and indeed, for all programs I write—was to challenge myself a little. In other words, with each new program I want to make the RUNs execute a little smoother, to use statements I haven't used before—if appropriate—and to learn some new techniques.

In this one I learned two: 1) the use of the INKEY\$ statement at the end of each of the graphics subroutines and 2) the use of logical operators in lines 128 and 200-225.

The Program

The program is written in Radio Shack Level II BASIC and runs on a 4K machine. In fact, just as it is, it uses 2919 bytes, and I could have trimmed that some. There are a number of unnecessary THENs, and readers will doubtless find dozens of other ways I could have tightened things up.

Frankly, though, I'm of the philosophy that memory is cheap, and nobody is paying me

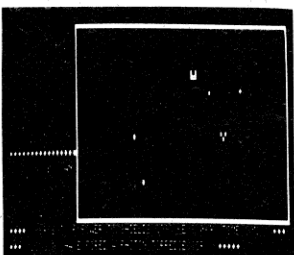
to squeeze every byte till it hollers. So, if I have enough memory to run my program the way I want it to, I'm satisfied. After all, if you're a beginner at this like I am, when you set yourself a problem to solve, you're tickled to find any way to get it done. Only when you've solved it at all do you look for ways to solve it better.

Speaking of memory, as I was writing, I didn't think I'd have enough for a lot of REM statements, so I didn't use any. I'll try to make up for that here by explaining everything I should have REMarked on in the text. First, the variables:

A1-computer's score
B1-player's score
A-computer's choice of weapons
B-player's choice of weapons
B\$-used to convert player's choice to a number
Q-sets limit on rounds played
R-counts rounds played
C\$-should be obvious, but, if not, is used to allow player to stop or continue.
Y\$-interim variable in INKEY\$ routine

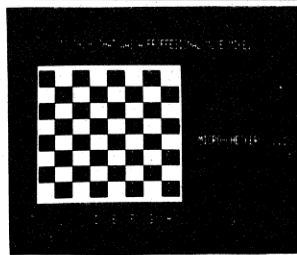
Discovering the INKEY\$ routine in the Level II manual was a happy event for me. To explain why, let me belabor the obvious for a moment and outline in some detail the problem it solved for me.

SOFTWARE → TRS-80 ← SOFTWARE



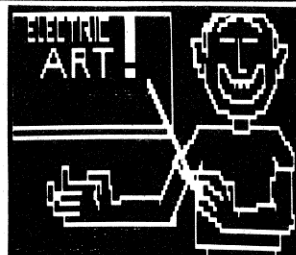
PACKAGE ONE INCLUDES: GRAPHIC-TREK "2000" — This full graphics, real time game is full of fast, exciting action! Exploding photon torpedoes and phasers fill the screen! You must actually navigate the enterprise to dock with the giant space stations as well as to avoid klingon torpedoes! Has shields, galactic memory readout, damage reports, long range sensors, etc! Has 3 levels for beginning, average, or expert players! ★ **INVASION WORG** — Time: 3099, Place: Earth's Solar System Mission: As general of Earth's forces, your job is to stop the Worg Invasion and destroy their outposts on Mars, Venus, Saturn, Neptune, etc! Earth's Forces: Androids — Space Fighters — Laser Cannon — Neutrino Blasters! Worg Forces: Robots — Saucers — Disintegrators — Proton Destroyers! Multi level game lets you advance to a more complicated game as you get better! ★ **STAR WARS** — Maneuver your space fighter deep into the nucleus of the Death Star! Drop your bomb, then escape via the only exit! This graphics game is really fun! May the Force be with you! ★ **SPACE TARGET** — Shoot at enemy ships with your missiles. If they eject in a parachute, capture them or if you're cruel, destroy them! Full graphics, real time game! ★ **SAUCERS** — This fast action graphics game has a time limit! Can you be the commander to win the distinguished cross! Requires split second timing to win! Watch out!

ONLY \$12.95



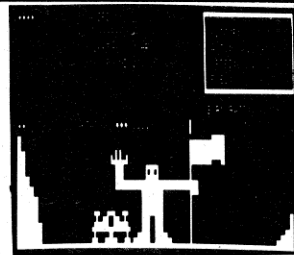
PACKAGE TWO INCLUDES: CHECKERS 2.1 — Finally! A checkers program that will challenge everyone! Expert as well as amateur! Uses 3-ply tree search to find best possible move. Picks randomly between equal moves to assure you of never having identical games. ★ **POKER FACE** — The computer uses psychology as well as logic to try and beat you at poker. Cards are displayed using TRS-80's full graphics. Computer raises, calls, and sometimes even folds! Great practice for your Saturday night poker match! (Plays 5 card draw). ★ **PSYCHIC** — Tell the computer a little about yourself and he'll predict things about you, you won't believe! A real mind bender! Great amusement for parties. ★ **TANGLE MANIA** — Try and force your opponent into an immobile position. But watch out, they're doing the same to you! This graphics game is for 2 people and has been used to end stupid arguments. (And occasionally starts them!) ★ **WORD SCRAMBLE** — This game is for two or more people. One person inputs a word to the computer while the others look away. The computer scrambles the word, then keeps track of wrong guesses.

ONLY \$12.95



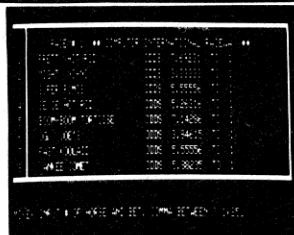
PACKAGE THREE INCLUDES: POE-TRY — This program lets you choose the subject as well as the mood of the poem you want. You give TRS-80 certain nouns or names, then the mood, and it does the rest! It has a 1000-word + vocabulary of nouns, verbs, adjectives and adverbs! ★ **ELECTRIC ARTIST** — Manual: draw, erase, move as well as, Auto: draw, erase and move. Uses graphics bits not bytes. Saves drawing on tape or disk! ★ **GALACTIC BATTLE** — The Swineus enemy have long range phasers but cannot travel at warp speed! You can, but only have short range phasers! Can you blitzkrieg the enemy without getting destroyed! Full graphics — real time! ★ **WORD MANIA** — Can you guess the computer's words using your human intuitive and logical abilities? You'll need to, to beat the computer! ★ **AIR COMMAND** — Battle the Kamikaze pilots. Requires split second timing. This is a FAST action arcade game.

ONLY \$12.95



PACKAGE FOUR INCLUDES: LIFE — This Z-80 machine language program uses full graphics! Over 100 generations per minute make it truly animated! You make your starting pattern, the computer does the rest! Program can be stopped and changes made! Watch it grow! ★ **SPACE LANDER** — This full graphics simulator lets you pick what planet, asteroid or moon you wish to land on! Has 3 skill levels that make it fun for everyone. ★ **GREED II** — Multi-level game is fun and challenging! Beat the computer at this dice game using your knowledge of odds and luck! Computer keeps track of his winnings and yours. Quick fast action. This game is not easy! ★ **THE PHAROAH** — Rule the ancient city of Alexandria! Buy or sell land. Keep your people from revolting! Stop the rampaging rats. Requires a true political personality to become good! ★ **ROBOT HUNTER** — A group of renegade robots have escaped and are spotted in an old ghost town on Mars! Your job as "Robot Hunter" is to destroy the pirate machines before they kill any more settlers! Exciting! Challenging! Full graphics!

ONLY \$12.95



PACKAGE FIVE INCLUDES: SUPER HORSE RACE — Make your bets just like at the real racetrack! 8 horses race in this spectacular graphic display! Up to 9 people can play! Uses real odds but has that element of chance you see in real life! Keeps track of everyone's winnings and losses. This is one of the few computer simulations that can actually get a room of people cheering! ★ **MAZE MOUSE** — The mouse with a mind! The computer generates random mazes of whatever size you specify, then searches for a way out! The second time, he'll always go fastest route! A true display of artificial intelligence! Full graphics, mazes & mouses! ★ **AMOEBA KILLER** — You command a one man submarine that has been shrunk to the size of bacteria in this exciting graphic adventure! Injected into the president's bloodstream, your mission is to destroy the deadly amoeba infection ravaging his body! ★ **LOGIC** — This popular game is based on Mastermind but utilizes tactics that make it more exciting and challenging — has 2 levels of play to make it fun for everyone. ★ **SUBMARINER** — Shoot torpedoes at the enemy ships to get points. Fast action graphics, arcade type game is exciting and fun for everybody!

ONLY \$12.95

HARDWARE → TRS-80 ← HARDWARE

MICRO SPEED

Upgrade your "slow" TRS-80 to a SUPER FAST MACHINE!! (2.66 MHZ) over 50% FASTER! Some of the features:

Auto turn-off during cassette or disk access. (This means NO lost programs EVER!) (Turns back on automatically too!) MANUAL control. (Unit may be turned on or off at any time. Yes even during program execution!) Keyboard indicator light "blinks" when micro-speed is on. Stops blinking when off! Don't wait for SARGON II or any other program!!! Comes with easy to follow instructions. (Some soldering required.) OR take to your local computer store or TV-Appliance Center for quick installation. (5-10 minutes!!) Works with any model, TRS-80.

ONLY \$24.95 complete

MICRO BEEP

Simple hook up: Just plug cassette remote jack into unit.

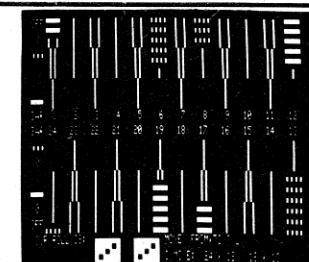
EASILY CONTROLLED FROM BASIC:

OUT 255.4 = on
OUT 255.0 = off

MICRO-BEEP make games more fun as well as provide useful sound output for professional applications!

Works with Any Model I TRS-80

ONLY \$9.95 complete



PACKAGE SEVEN INCLUDES: BACKGAMMON 5.0 — 2 different skill levels make this game a challenge to average or advanced players FAST (15 second avg) Looks for best possible move to beat you! FANTASTIC GRAPHICS. Plays doubles and uses international rules ★ **SPEED READING** — Increases your reading speed. Also checks for comprehension of material. Great for teenagers and adults to improve reading skills ★ **PT 109** — Drop depth charges on moving subs. Lower depths get higher points in this fast action graphics game. ★ **YAHTZEE** — Play Yahtzee with the computer! This popular game is even more fun and challenging against a TRS-80! ★ **WALL STREET** — Can you turn your \$50,000 into a million dollars? That's the object of this great game Simulates an actual stock market!

ONLY \$12.95

PACKAGE SIX INCLUDES: 20 HOME FINANCIAL PROGRAMS — Figures amortization, annuities, description rates, interest tables, earned interest on savings and much, much more. These programs will get used again and again. A must for the conscientious, inflation minded person.

ONLY \$12.95

SIMUTEK

Exceptional Products through Research & Imagination

Send Check, Money Order or Bank Card No. orders to:

SIMUTEK
P.O. Box 35298
Tucson, AZ 85740

Please Add 2.50
Per Order For
Postage & Handling

24 HOUR (7 days) HOTLINE
Master Charge (602) 882-3948 Visa
(C.O.D. \$3 extra)

Same Day Shipment on Bank Cards,
Money Orders & C.O.D.

All Tape Programs Require a Minimum of 16K Level 2
Packages Available on Diskette (32K System) \$4.25 Extra

3 or More Packages Get 10% Discount

Dealer Inquiries Invited

TRS-80 IS A REGISTERED TRADEMARK OF TANDY CORP.

The Problem

Many programs—especially games—begin with a lot of PRINT statements that fill the screen with instructions. If, like me, you don't have a printer, what happens? That's right! On the TRS-80 everything but the last 16 lines scrolls right off the top! I can't read nearly as fast as that bear moves!

Or, in graphics routines, you have to go to an endless loop to keep the picture on screen and to keep a prompt from marring it. This means using BREAK and CONT(inue) to get going again, which I don't like.

I had been using timing loops in these situations, but that was very unsatisfactory—never the right delay for everybody! Using the INKEY\$ routine returns complete control of timing to the human side of the interface.

Lines 1032, 2040 and 3040, which use this procedure, are copied directly from the Level II manual. If you haven't read up on the INKEY\$ statement, here is a brief rundown. INKEY\$ is similar to INPUT, but the computer, instead of halting com-

pletely and waiting for an INPUT, goes into a loop of strobing the keyboard (one strobe takes only microseconds). If no key is pressed (Y\$ = ""), nothing happens.

Look at line 3040. It is actually two nested loops. Pressing any key breaks the INKEY\$ loop. Then, by the failure of the Y\$ = "" condition to be fulfilled, the GOTO 3040 loop and the program continues. (Note: If there is no PRINT statement used with INKEY\$, the key you press will not be displayed.)

Logical Operators

In line 128 I use the AND function to check for the case in which the player makes any entry except one of the precise strings in lines 115-125. This is a standard device for keeping the program on the right track, and there's nothing earthshaking about it, but this way of doing it seems efficient. And if you look at lines 115-128, you may conclude, as I did, that there's no better (other?) way to avoid confusion. Consider: If you use three successive checking

statements of the form: "IF B\$ <> "", then every time the player's choice doesn't match that of the first such statement, the program will GOTO 134, and then to 110. In other words, assuming the order in which this program is written, you could never play anything but "ROCK."

In lines 220-225 I use the logical operators to accomplish the scoring. Not counting stand-offs, which are disposed of in line 150, there are six possible outcomes—three possible pairs of weapons times two possible winners. These lines simply examine each of the six to see who won the round.

Nested Subroutines

The last thing in this program that was new for me was using nested subroutines. With the swirling combinations of pairs of choices, pictures and winner/losers that the game gives rise to, I still don't know any other way to make it work!

SUBs 600, 700 and 800 simply pick which picture to draw by sending the program to SUBs

1000, 2000, or 3000. Within each of those you'll notice very similar routines in the lines ending in 25 and 30. This is the way I avoided having to draw each picture twice, according to the winner.

Conclusion

Look at lines 110 to 420. Also, remember that in the TRS-80, when a variable is assigned a location and value in memory, that variable is changed *only* by: 1) turning off the machine; 2) typing in NEW; or 3) instructing the machine to change it.

"So what?" did you say? Just this. This means that once the player has chosen his weapon, his choice remains the same *until he changes it*, even though the computer picks anew after every round and every standoff. Therefore, each time you're told to hit ENTER to go on, you can hit it twice and play another round with the same weapon. This makes for a fast game and suggests some interesting speculations on probability.

That's it! Try it and see if you like it. ■

```

JLIST
0
5 CLS
10 PRINT TAB(18)"ROCK,SCISSORS, PAPER GAME"
15 PRINT TAB(24)"BY DODD HARRIS"
20 PRINT TAB(24)"ANCHORAGE, KY"
25 PRINT TAB(26)"JUNE,1979"
27 FOR X = 1 TO 1000: NEXT X
30 PRINT
35 PRINT TAB(24)"RULES"
40 PRINT "THIS GAME IS PLAYED AGAINST THE COMPUTER."
45 PRINT "BOTH YOU AND YOUR OPPONENT WILL CHOOSE AMONG"
50 PRINT "ROCK, SCISSORS, AND PAPER. THE WINNING/LOSING"
55 PRINT "COMBINATIONS ARE AS FOLLOWS:"
60 PRINT TAB(15)"ROCK CRUSHES SCISSORS (ROCK WINS)"
65 PRINT
70 PRINT TAB(14)"SCISSORS CUT PAPER (SCISSORS WINS)"
75 PRINT
80 PRINT TAB(17)"PAPER COVERS ROCK (PAPER WINS)"
85 PRINT
100 A1 = 1: B1 = 1
107 INPUT "HOW MANY ROUNDS DO YOU WANT TO PLAY?";Q
108 FOR R = 1 TO Q
110 INPUT "CHOOSE ROCK, OR SCISSORS, OR PAPER";B$
115 IF B$ = "ROCK" THEN B = 1
120 IF B$ = "SCISSORS" THEN B = 2
125 IF B$ = "PAPER" THEN B = 3
128 IF B$ <> "ROCK" AND B$ <> "SCISSORS" AND B$ <> "PAPER" THEN 134
130 GOTO 150
134 PRINT "YOU TYPED IT IN WRONG. PLEASE TRY AGAIN.": GOTO 110
150 IF A = B THEN PRINT "STANDOFF - TRY AGAIN": GOTO 109
155 IF A = 1 THEN GOSUB 600
160 IF A = 2 THEN GOSUB 700
165 IF A = 3 THEN GOSUB 800
200 IF A = 1 AND B = 2A1 = A1 + 1
205 IF A = 1 AND B = 3B1 = B1 + 1
210 IF A = 2 AND B = 1B1 = B1 + 1
215 IF A = 2 AND B = 3A1 = A1 + 1
220 IF A = 3 AND B = 1A1 = A1 + 1
225 IF A = 3 AND B = 2B1 = B1 + 1
310 PRINT TAB(16)"PLAYER"; TAB(48)"COMPUTER"
315 PRINT TAB(18)B1; TAB(52)A1
400 NEXT R
405 INPUT "WANT TO PLAY SOME MORE?";C$
410 IF C$ = "YES" GOTO 100
415 PRINT "O.K.! SO LONG!"
420 END
600 IF B = 2 GOSUB 1000
610 IF B = 3 GOSUB 2000
615 RETURN
700 IF B = 1 GOSUB 1000
710 IF B = 3 GOSUB 2000
715 RETURN
800 IF B = 1 GOSUB 3000
810 IF B = 2 GOSUB 2000
815 RETURN
1000 CLS

```

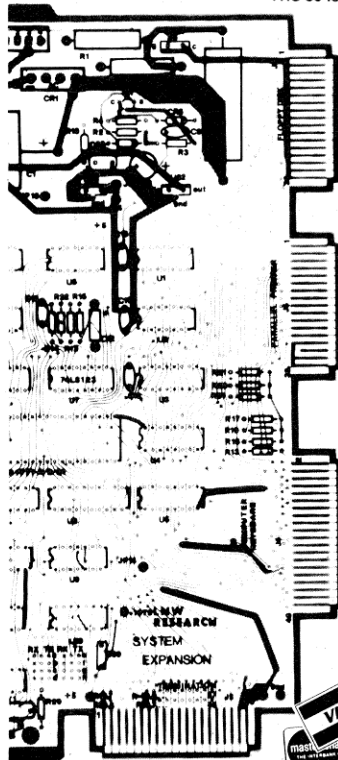
```

1001 SET(57,29):SET(58,29):SET(68,29):SET(69,28):SET(70,27)
1005 SET(71,26):SET(72,25):SET(56,30):SET(59,30): FOR X = 6
3 TO 65
1010 SET(X,30): NEXT X:SET(56,31):SET(59,31): FOR X = 62 TO
67
1011 SET(X,31): NEXT X:SET(57,32):SET(58,32): FOR X = 60 TO
66
1012 SET(X,32): NEXT X: FOR X = 60 TO 69:SET(X,33): NEXT X
1013 SET(61,34):SET(62,34):SET(57,35):SET(58,35):SET(60,35)
1014 SET(63,35):SET(56,36):SET(59,36):SET(64,36):SET(56,37)
1015 SET(59,37):SET(65,37):SET(57,38):SET(58,38):SET(66,38)
1016 SET(67,39)
1020 PRINT @941"ROCK CRUSHES SCISSORS"
1025 IF B = 2 PRINT @964" - COMPUTER WINS"
1028 IF B = 1 PRINT @964" - PLAYER WINS"
1030 PRINT @980"HIT 'ENTER' TO CONTINUE"
1032 Y$ = INKEY$: IF Y$ = "" THEN 1032
1033 RETURN
2000 CLS
2001 SET(34,25):SET(33,26):SET(32,27):SET(31,28):SET(30,29)
2002 SET(20,27):SET(21,27):SET(19,28):SET(22,28):SET(19,29)
2003 SET(22,29):SET(20,30):SET(21,30):SET(23,30):SET(29,30)
2004 SET(24,31): FOR X = 28 TO 45:SET(X,31): NEXT X: FOR X =
25 TO 28
2005 SET(X,32): NEXT X:SET(44,32):SET(24,33):SET(27,33):SET
(43,33)
2006 SET(20,34):SET(21,34):SET(23,34): FOR X = 26 TO 42:SET
(X,34)
2007 NEXT X:SET(19,35):SET(22,35):SET(30,35):SET(19,36)
2008 SET(22,36):SET(31,36):SET(20,37):SET(21,37):SET(32,37)
2009 SET(33,38):SET(34,39)
2020 PRINT @920"SCISSORS CUT PAPER"
2025 IF B = 2 PRINT @940" - PLAYER WINS"
2030 IF B = 3 PRINT @940" - COMPUTER WINS"
2035 PRINT @980"HIT 'ENTER' TO CONTINUE"
2040 Y$ = INKEY$: IF Y$ = "" THEN 2040
2045 RETURN
3000 CLS
3001 FOR X = 58 TO 74:SET(X,34): NEXT X
3002 SET(57,35):SET(73,35):SET(56,36):SET(72,36)
3003 FOR X = 55 TO 71:SET(X,37): NEXT X
3004 FOR X = 61 TO 67:SET(X,38): NEXT X
3005 FOR X = 60 TO 68:SET(X,39): NEXT X
3020 PRINT @919"PAPER COVERS ROCK"
3025 IF B = 3 PRINT @940" - PLAYER WINS"
3030 IF B = 1 PRINT @940" - COMPUTER WINS"
3035 PRINT @980"HIT 'ENTER' TO CONTINUE"
3040 Y$ = INKEY$: IF Y$ = "" THEN 3040
3045 RETURN

```

Program listing

TRS-80 is a registered trademark of TANDY CORP.



SYSTEM EXPANSION FOR THE TRS-80™

AT
\$69.95 [PC BOARD & USER MANUAL]

- SERIAL RS232C/20 mA I/O
- FLOPPY CONTROLLER
- 32K BYTES MEMORY
- PARALLEL PRINTER PORT
- DUAL CASSETTE PORT
- REAL-TIME CLOCK
- SCREEN PRINTER BUS
- ONBOARD POWER SUPPLY
- SOFTWARE COMPATIBLE
- SOLDER MASK, SILK SCREEN

**LNW
RESEARCH** ✓53

8 Hollowglen St. Irvine CA
714-552-8946 92714

TO ORDER
P.O. Box 16216 Irvine CA 92713
Add \$3 for postage and handling.
CA residents add 6% sales tax

Card No.

Expiration Date

Signature

DISK DRIVE WOES? PRINTER INTERACTION? MEMORY LOSS? ERRATIC OPERATION? DON'T BLAME THE SOFTWARE!



ISO-1



ISO-2

Power Line Spikes, Surges & Hash could be the culprit! Floppies, printers, memory & processor often interact! Our unique ISOLATORS eliminate equipment interaction AND curb damaging Power Line Spikes, Surges and Hash.

- *ISOLATOR (ISO-1A) 3 filter isolated 3-prong sockets; integral Surge/Spike Suppression; 1875 W Maximum load, 1 KW load any socket \$54.95
- *ISOLATOR (ISO-2) 2 filter isolated 3-prong socket banks; (6 sockets total); integral Spike/Surge Suppression; 1875 W Max load, 1 KW either bank \$54.95
- *SUPER ISOLATOR (ISO-3), similar to ISO-1A except double filtering & Suppression . . . \$79.95
- *ISOLATOR (ISO-4), similar to ISO-1A except unit has 6 individually filtered sockets . . . \$93.95
- *ISOLATOR (ISO-5), similar to ISO-2 except unit has 3 socket banks, 9 sockets total . . . \$76.95
- *CIRCUIT BREAKER, any model (add-CB) Add \$ 6.00
- *CKT BRKR/SWITCH/PILOT any model (-CBS) Add \$11.00

PHONE ORDERS 1-617-655-1532

Electronic Specialists, Inc.

171 South Main Street, Natick, Mass. 01760

Dept. 8M

TRS-80 THE LEAST EXPENSIVE PROGRAMS YOU CAN BUY.

Can 30 high-quality TRS-80 programs cost a mere \$19.95?

We have a lot to gain by almost losing our shirts. Because we're a new and growing software company. We're BASICS AND BEYOND. And in order to build, we need your business.

MICROCOSM I. Thirty programs with everything from our incredible "Atlantis" game that'll challenge your intellect, to "Flowering Houseplants" for valuable reference.

MICROCOSM II. Twenty programs that require skill: the desire for intense concentration as in "Decipher." And practical guides like "Stain Removal." Both packages, for 16K Level II, on quality tape cassettes, with hardcover storage case and detailed handbook, just \$19.95 each.

Our prices may never be lower. Send today.
BASICS & BEYOND, inc.
BOX 10 • AMAWALK, N.Y. 10501 (914) 962-2355
No charge for postage or handling. N.Y. residents add 6% sales tax.

kilobaud

MICROCOMPUTING™

for business . . . education . . . FUN!

Yes! Please send me Kilobaud MICROCOMPUTING at a saving of 40% to 50% off the newsstand price.

- ☐ 12 issues for \$18 (save 40%)
- ☐ 24 issues for \$30 (save 50%)
- ☐ 36 issues for \$45 (save 50%)
- ☐ New subscription ☐ Renewal
- ☐ Payment enclosed \$ _____
- ☐ VISA ☐ MC ☐ AE ☐ Bill me

Card # _____ Exp. date _____

Signature _____

Name _____

Address _____

City _____ State _____ Zip _____

—for even faster service call toll-free (800) 258-5473

Canada: same as US, in US funds.
Other foreign: \$23 one year only, US funds.

304B8

MICROCOMPUTING • POB 997 • Farmingdale NY 11737

Technology plus Corporation

40-PIN EDGE CONNECTORS

(wirewrap style)

For Your TRS-80 or Superbrain.

\$3.95—Nickel plated phosphor bronze contacts.

\$7.95—Gold plated contacts.

OR—

Try our 3D40 edge card for your TRS-80. The 3D40 is a precision double sided P.C. board with 40-pin connector in front, wired to 316-pin dip sockets in back. Use the 3D40 with dip ribbon cables and solderless breadboards to make TRS-80 interfacing experiments a snap! \$15.95

ALSO—Coming soon for your TRS-80

THE SCHEDULER

An inexpensive system of hardware and software that provides a real time clock and wireless remote control of 256 external devices for your TRS-80.

P.O. Box 566
Westfield, MA.
01085

✓208

Diskette SALE

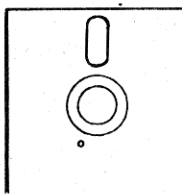
WE WILL NOT BE UNDERSOLD!!!

Find the best price you can in this magazine on a box of 10, 5 1/4" Verbatim diskettes and

**Subtract
50¢**

(Low discount price—\$26.50)

THAT'S OUR PRICE



**Alpha
Byte
Storage**

**4636 Park Granada 159
Calabasas California
91302 (213) 992-1970**

✓69

Offer good as long as supply lasts.
Please add 50¢ shipping in the Continental U.S.

TRS-80* STRUCTURED BASIC

Now available for TRS-80 disk systems



A pre-compiler adding performed procedures, case structures, repeat while, until and many other structured language statements to the already powerful Level II BASIC. Diskette \$50.00, Listing \$35.00, Manual purchased separately \$10.00.

ULTIMATE COMPUTER SYSTEMS

313 Meadow Lane
Hastings, Michigan 49058
(616) 945-5334

(Dealer inquiries invited)

✓84

*TRS-80 is a trademark of Tandy Corp.

EXPANDED MAILLIST SYSTEM

By Harry Hopkins

After 18 months of development and one year in field testing C.E.C.S. now releases the most complete mailing list system available for the TRS-80, at a special low introductory price of \$59.95. The system requires a single disk, a 32k interface and a printer.

The Expanded Maillist System utilizes an exclusive machine language sort which allows for the sort of 500 records by name, state or zip code in 5 seconds! The system has complete error trapping and recovery such as automatically saving the file when memory space is full and remaining in the system under a 'file not found' condition. The system also has multiple file and reorganization capabilities.

The following fully linked programs are included in the Expanded Maillist System:

1. **DUPLICATE CHECKING**—Checks for duplicates as you enter and also has a separate routine that will purge an entire file of duplicate names with a single command.
2. **FILE MAINTENANCE**—Used for adding, deleting and complete editing of your mail list files.
3. **LABEL AND LIST PRINTING**—Allows selective printing of labels or lists on up to a ten digit key. Also has full suppression capability. For example, if you want a list of everyone in your file with a 'JAN' in their key code except those with an '80', you should select 'JAN' and suppress '80'.
4. **STATUS ANALYSIS**—This program will generate statistical reports on the percentages of names with certain keys or regional breakdown. Very useful for last issue notices on labels.
5. **FILE REORGANIZATION**—With this program you may reorganize your files into specific alpha or zip code ranges for true multi-file capability.
6. **MULTI-PURPOSE LABEL UTILITY**—Provides formatted printing of labels for special applications.

Expanded Maillist System on diskette with manual \$59.95
Manual only \$3 with full credit towards purchase.

AMCT-80

By Earl Peterson

This automatic morse code teacher for the 16k, level 2 TRS-80 is the only morse code program that will automatically (at your option) slow down or speed up depending on your proficiency to receive code. It includes 9 preprogrammed progressive exercises. Fully variable speed up to 30 w.p.m., 1-9 characters per group, and 1-9 spaces between groups are user selected options. The send mode allows for keyboard entry concurrent to sending by utilizing a 256 byte ring buffer. There are 9 user programmable messages of 64 characters each.

This machine language program is truly the morse code teacher of tomorrow today!

AMCT-80 on cassette with full documentation \$14.95
Dealer inquiries invited.

COST EFFECTIVE COMPUTER SERVICES

1041 Ute — P. O. Box 3543 Grand Junction, CO 81502
(303) 243-3629

✓52



SAVE!! TRS-80



10, 15 Percent and More!

on computers, peripherals, software and other Radio Shack® products.

Offered Exclusively By

**Pan American
Electronics, Inc.**

A Radio Shack®
Authorized Sales Center

1117 CONWAY MISSION, TEXAS 78572

Toll Free 800/531-7466

✓64

Texas & Main No. 512/581-2765

NO TAXES collected on out-of-state shipments.
FREE delivery available on minimum orders.
WARRANTIES honored by Radio Shack®.



Generate semi-professional captions for video productions.

Video Titler

Mark Rotzien
413 Cedar Ave.
Minneapolis, MN 55454

What's that, you say? Not another super-mega-banner program? Well, yes... and no. While the intent of the program is indeed to format text on the screen, it has a more serious application.

The inspiration for this program was a comment dropped

by a friend, as she watched data flickering by on my monitor.

"You know," she said, "it would be very handy to put titles and credits on my tapes by using something like that."

She is attempting to break into the independent video production market.

Initial Resolution Losses

I gave it some thought, since professional titlers are quite expensive. I could, of course, modulate the output of my TRS-80,

using an inexpensive video modulator circuit, and simply record it as a channel 3 signal.

Unfortunately, I had tried something like that long ago. The resolution losses suffered through the modulator, tuner circuitry and narrow bandwidth of television receivers made it very unsatisfactory.

I realized after further reflection that there was no need to modulate the computer's output at all. My friend's VTR has the usual camera input, and it

doesn't care whether the signal comes from a camera or a computer, as long as it is composite video!

Titler accepts your text and formats it on the screen with many options.

The program will present your titles, credits, etc., on separate video "pages," using from 1 to 14 lines of text per page. Lines may be single, double or triple-spaced.

A line of text can consist of any characters—except a com-

Program Listing

```

100 DEFINT A-Z
110 CLEAR 2000:GOSUB 1120:INPUT "DO YOU WANT INSTRUCTIONS
";IS:IF LEFT$(IS,1)="Y" THEN GOSUB 1140
120 DIM LN(100),MS(100),MARGIN(100)
130 GOSUB 1230:' HEADING
140 GOSUB 570:' GET PAGES
150 GOSUB 600:' GET # LINES IN PAGE
160 GOSUB 720:' TYPE FACE
170 GOSUB 870:' FRAME?
180 GOSUB 750:' GET LOCATION ON SCREEN
190 GOSUB 830:' GET SPACING
200 GOSUB 900:' GET SCROLL PARAMETERS
210 GOSUB 940:' INSERT COMMAS,ETC.
220 GOSUB 240:' PRINT IT & WAIT FOR EDIT
230 GOSUB 1250:GOSUB 1120:GOSUB 1250:GOTO 1270:' EDITTING
240 ' PRINT IT
250 IF TP=1 THEN GOTO 370
260 A=L:Z=1:V=1
270 FOR X=1 TO C:MARGIN(X)=INT((63-LEN(MS(X)))/2):IF MARGIN
(X)/2 <> INT(MARGIN(X)/2) THEN MARGIN(X)=MARGIN(X)-1
280 NEXT X:CLS:IF FR=1 THEN GOSUB 990
290 GOSUB 1250
300 Z=1:FOR X=1 TO C
310 IF LEFT$(SCS,1)="Y" THEN GOSUB 510:A=A+1-LEN(MS(X)):GOTO
340
320 GOSUB 1420:' PROTECT AGAINST RUNNING OFF SCRIN
330 PRINT@A1+MARGIN(X),MS(X);
340 IFX=C THEN RETURN
350 IFZ=LN(P) THEN P=P+1:Z=1:A=A+1:GOSUB 1250:GOSUB 1080:GO
SUB 1250:A=L:Z=1:NEXT
360 Z=Z+1:A=A+1:A=A+64*SP:GOSUB 1420:NEXT
370 A=L:P=1:Z=1:V=2
380 FORX=1 TO C
390 MARGIN(X)=INT((63-2*(LEN(MS(X))))/2):IF (MARGIN(X)/2
)<>INT(MARGIN(X)/2) THEN MARGIN(X)=MARGIN(X)+1
400 MARGIN(X)=MARGIN(X)-2
410 NEXT:GOSUB 1120
420 IF FR=1 THEN GOSUB 990
430 GOSUB 1250
440 FORX=1 TO C
450 IF LEFT$(SCS,1)="Y" THEN GOSUB 510:A=A+1-LEN(MS(X)):
GOTO 480
460 GOSUB 1420
470 PRINT@A1+MARGIN(X),MS(X);
480 IFX=C THEN RETURN
490 IFZ=LN(P) THEN P=P+1:Z=1:A=A+1:GOSUB 1250:GOSUB 1030:GO
SUB 1250:A=L:Z=1:NEXT
500 Z=Z+1:A=A+1:A=A+64*SP:GOSUB 1420:NEXT
510 FORW=1 TO LEN(MS(X))
520 PRINT@A1+MARGIN(X),MID$(MS(X),W,1);:
530 FOREE=1 TO 3*SC:NEXT
540 A=L+V
550 NEXTW:RETURN
560 STOP
570 '# PGS
580 PRINT:PRINT:INPUT "ENTER THE NUMBER OF PAGES ";PG
590 IF PG=0 OR PG>100 THEN 580 ELSE RETURN
600 '# LNS/PG
610 FORX=1 TO PG
620 PRINT:PRINT "NUMBER OF LINES IN PAGE";X;:INPUT LN(X):
IF LN(X)>14 THEN PRINT "TOO MANY LINES.":GOTO 620
630 NEXTX
640 FORX=1 TO PG:C=C+LN(X):NEXT
650 P=1:A=L:Z=1
660 GOSUB 1120:PRINT@16,"PAGE";P
670 PRINT:PRINT:PRINT "LINE";A;:INPUT M$(A)
680 IFA=C THEN RETURN
690 IFZ=LN(P) THEN P=P+1:Z=1:A=A+1:GOTO 660
700 A=A+1:Z=Z+1
710 GOTO 670
720 TP=0:GOSUB 1120:INPUT "(L)ARGE OR (S)MALL TYPE";TP$
730 IF TP$="L" THEN TP=1:TP$=""
740 RETURN
750 ' POSITION
760 GOSUB 1120:PRINT "LOCATION : 1. TOP":PRINT "
2. CENTER":PRINT "3. BOT"
770 PRINT:PRINT:INPUT "YOUR CHOICE";LC
780 IF LC=0 OR LC>3 THEN 770
790 IF LC=1 THEN L1=64
800 IF LC=2 THEN L1=384
810 IF LC=3 THEN L1=896
820 RETURN
830 'SPCING
840 GOSUB 1120:PRINT "SPACING : 1. SINGLE":PRINT "
2. DOUBLE":PRINT "3. TRIPLE"
850 PRINT:PRINT:INPUT "YOUR CHOICE ";SP:IF SP=0 OR SP>5 THE
N 850
860 RETURN

```

ma or a colon—or can be a null, i.e., no characters at all.

In this way you can vary the spacing to suit yourself.

After inputting the text, the screen clears and allows the user to roll the VTR. Pressing any key causes page one to be printed. Press again and the screen clears to allow pauses, if necessary.

Pressing again prints page two, etc.

After the last page is printed, roll enough blank tape to lead into the subject matter. Press any key and you are now in edit mode, where you can change line contents, scroll rate, type size, etc.

Since most VTRs allow monitoring, it is easy to hook one up and run the program. When the titles look O.K. on the television, record them.

The Program

Titler is written for the TRS-80, Level II, 16K. With some pruning it could easily fit in 4K.

To adapt it to another machine, your BASIC must have a

comprehensive set of string handling functions and complete output formatting capability.

The subroutines at 870-890 and 990-1020 let the user put a frame around the text. It is not erased between pages.

This is included because on some VTRs, a totally blank screen results in annoying color fringes when the first line appears. Using the frame apparently kicks in the color-killer circuitry and gives much cleaner type. Of course, if your computer outputs color, you won't have this problem.

Lines 270-280 and 380-410 determine the margins for each line of text. Since two type sizes are available with the TRS-80, the margins depend on the type size you choose. When entering the text, don't use more than 60 characters of small type or 30 characters of large type. If you exceed these lengths the lines cannot be centered on the screen.

If your television is anything like mine, then you'll want near-

ly all your titles in large type anyway.

Lines 940-980 remedy Level II's inability to accept a comma. When you want a comma you must use the up arrow (exponent symbol). It is then processed into a comma.

Level II will not accept a colon, either. For lack of another key to use in its place, I left it that way. Use a semi-colon or a dash.

The subroutine at 1250-1260 uses an interesting feature of Level II. Inkey\$ is an instant scan of the keyboard. If no key is pressed, it is a null. Inkey\$ is used here to provide a transition between pages.

Lines 1420-1430 prevent the text from running off the bottom of the screen, producing annoying FC ERROR messages.

If several lines are to be displayed at the bottom of the screen on the same page, each new line will write over the old one. If the lines are scrolled slowly, it makes an attractive display.

The rest of the program is

relatively self-explanatory. I've used REMark lines liberally. They can be deleted, along with the instructions, to save memory.

Also, the size of the arrays in line 120 is rather exorbitant, unless you have to use 100 pages of information as I did!

A Final Warning

Any time you connect another piece of equipment to your system you should consider its safety. While your computer is itself isolated from the line, perhaps your monitor or other equipment isn't.

If you connect the computer directly to the VTR, which is in turn directly connected to the television receiver, you may be asking for trouble.

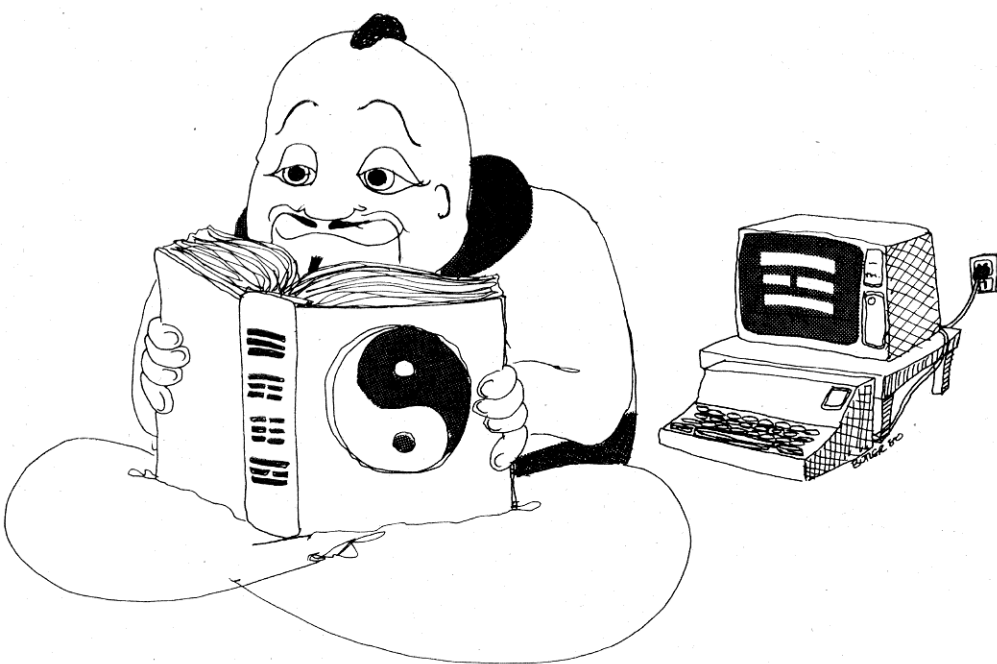
If there is the *slightest* doubt in your mind whether any equipment is isolated from the line: STOP! I advise the liberal use of isolation transformers—they are cheap insurance against a nasty and expensive surprise.

Good luck and...ahem... roll the credits! ■

Program Listing (cont.)

```
870 GOSUB1120:PRINT"DO YOU WISH A FRAME FOR TEXT ?"
880 FR=0:PRINT:INPUTFR$:IFLEFT$(FR$,1)="Y"THENFR=
1
890 RETURN
900 'SCROLL
910 GOSUB1120:PRINT"DO YOU WANT THE TEXT TO SCROLL ":IN
PUT"ON THE SCREEN ";SC$
920 IFLEFT$(SC$,1)<>"Y"THENRETURN
930 PRINT:PRINT:INPUT"HOW FAST ( 1 TO 9 )":SC:RETURN
940 'FIX UP RADIO SHACK STRINGS
950 FORX=1TOC
960 PORT=1TOLEN(M$(X))
970 IFMID$(M$(X),T,1)=[ "THENM$(X)=LEFT$(M$(X),T-1)+",
+MID$(M$(X),T+1)
980 NEXTT:NEXTX:RETURN
990 'FRAME
1000 FORG=0TO127:SET(G,0):SET(G,47):NEXT:IFTP=1 THENFOR
G=0TO47:SET(0,G):SET(125,G):NEXT
1010 IFTP<>1 THENFORG=0TO47:SET(0,G):SET(1,G):SET(126,G
):SET(127,G):NEXT
1020 RETURN
1030 IFFR<>1GOTO1120
1040 V1=L1
1050 PRINT@V1+2," ";
1060 V1=V1+64:IFV1>=960THEN1070ELSE1050
1070 RETURN
1080 IFFR<>1 THENCLS:RETURN
1090 V1=L1
1100 PRINT@V1+1," ";
1110 V1=V1+64:IFV1>=960THENRETURNELSE1100
1120 CLS
1130 PRINTCHR$(23):RETURN
1140 'INSTR
1150 GOSUB1120
1160 PRINT" THIS IS A TITLER PROGRAM":PRINT"FOR USE W
ITH VTR'S."
1170 PRINT:PRINT" IT IS DESIGNED TO PRESENT":PRINT"TE
XT AS VIDEO 'PAGES', WITH":PRINT"BLANK SCREEN BETW
EEN PAGES.":PRINT:PRINT" YOU MUST PREPLAN HOW MA
NY":PRINT"PAGES OF TEXT YOU WANT, AND HOW"
1180 PRINT"MANY LINES PER PAGE, TO A MAX-":PRINT"IMUM O
F 14. AFTER ENTERING THE":PRINT"TEXT, THE SCREEN W
ILL CLEAR":PRINT"AND PRESSING ANY KEY WILL PRINT"
```

```
1190 PRINT"THE FIRST PAGE.":PRINT:INPUT"PRESS ENTER TO
CONTINUE ";IS:GOSUB1120:PRINT" PRESSING ANY KEY
WILL CLEAR":PRINT"SCREEN - PRESSING AGAIN WILL":PR
INT"START THE SECOND PAGE, ETC."
1200 PRINT:PRINT" AFTER THE LAST PAGE, THE":PRINT"SCR
EEN WILL CLEAR AGAIN TO":PRINT"LEAVE BLANK LEADER
INTO YOUR":PRINT"SUBJECT. PRESSING A KEY AGAIN":P
RINT"WILL PUT YOU IN EDITING MODE."
1210 PRINT:PRINT" ENTERING A 'Y' OR 'N' WILL":PRINT"S
UFFICE FOR YES/NO QUESTIONS.":PRINT"YOU MUST USE T
HE '[' SYMBOL":PRINT"INSTEAD OF A COMMA."
1220 PRINT:INPUT"PRESS ENTER ";IS
1230 ' ? HEAD
1240 GOSUB1120:PRINT@16,"TITLER":PRINT@76,"-----":
RETURN
1250 'INSTRING
1260 IS=INKEY$:IFI$<>" "THENRETURNELSE1260
1270 GOSUB1120:INPUT"DO YOU WANT TO EDIT ";ED$:IFLEFT$(
ED$,1)<>"Y"THEN1410
1280 PRINT:PRINT:PRINT" EDIT TABLE"
1290 PRINT:PRINT"1. NEW SPACING":PRINT"2. CHANGE TYPE":
PRINT"3. EDIT A LINE":PRINT"4. CHANGE SCROLL RATE"
:PRINT"5. SHIFT POSITION ON SCREEN":PRINT"6. FRAME
?"
1300 PRINT:PRINT:INPUT"YOUR CHOICE ";CE:IFCE=0 ORCE>6TH
EN1300
1310 ONCEGOSUB830,720,1330,900,1360,870
1320 GOSUB1120:INPUT"ANY FURTHER EDITING ";FE$:IFLEFT$(
FE$,1)="Y"THEN1280ELSE1410
1330 GOSUB1120:INPUT"WHICH LINE DO YOU WANT TO EDIT":LL
1340 PRINT:PRINT:PRINTM$(LL):PRINT:PRINT:INPUT"NEW LINE
";M$(LL)
1350 GOSUB940:RETURN
1360 GOSUB1120:INPUT"SHIFT (U)P OR (D)OWN ";ES
1370 PRINT:INPUT"HOW MANY LINES ";NL
1380 IFLEFT$(ES,1)="U"THENL1=L1-(64*NL):IFL1<64THENL1=6
4
1390 IFLEFT$(ES,1)="D"THENL1=L1+(64*NL):IFL1>896THENL1=
896
1400 GOSUB1420:RETURN
1410 PRINT:PRINT:INPUT"RUN DISPLAY AGAIN ";D$:IFLEFT$(D
$,1)="Y"THEN220ELSESTOP
1420 IFAL>=896THENAL=896:IFV=2 GOSUB1030ELSEGOSUB1080
1430 RETURN
```

I Ching

This program throws the sticks and displays your hexagram.

Anthony T. Scarpelli
RR1 Box 426
N. Windham, ME 04062

He added his own commentaries to the book and they are included in this English version by Richard Wilhelm/Cary F. Baynes.

The Principle of Opposites

The concepts of the *I Ching* are based on the dual principles of yin or yang, light or dark, positive or negative, evolution or devolution, in other words, op-

posites. When change occurs, these two opposite forces can be detected by coins, yarrow stalks, or in our case, our own intuition.

A two-sided coin can represent yin and yang. If heads or yang is given the number three, and tails, yin, is numbered two, then three coins thrown at the same time can come up with a total of six, seven, eight or nine.

Seven and nine represent a yang, while six and eight represent a yin.

The coins are thrown six times, and each total represents a line of the *I Ching* hexagram, which, starting at the bottom going upwards, are written down as shown in Fig. 1.

Six and nine are called the old yin and old yang respectively. According to the *I Ching* these two numbers have a tendency to change to their opposites so are assigned special symbols, the X or the O. When a hexagram, containing a six or a nine, has been thrown, a new hexagram is written down to reflect these changes (Fig. 2).

To diagnose a change, make a prediction, or when seeking advice, ask a question and with this question always in mind, throw the coins. Look up the hexagram in an *I Ching* table and read the text which accompanies one of the 64 possible hexagrams.

If you have thrown a six or nine read the text for those lines and then read the text for the

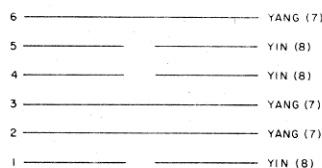


Fig. 1. A Thrown Hexagram

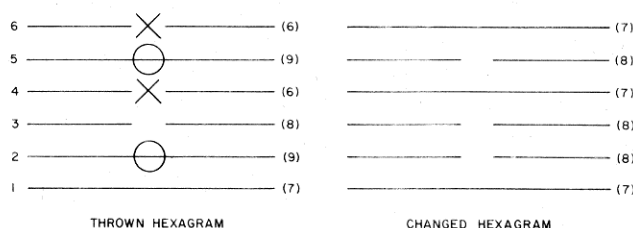


Fig. 2. How a Hexagram Changes.

Many people have heard about the *I Ching* and are not quite sure what it is. Many people have Radio Shack's TRS-80 microcomputer and wonder what they can do with it. The *I Ching* calculates life's changes and the TRS-80 makes life's calculations easier.

Life is change. A static flow of life cannot exist. The Chinese found 64 changing patterns of life and in time collected them into a book called the *I Ching*, literally, *Book of Changes*.

The book is from 3000 to 5000 years old and has undergone testing by the most venerable Chinese, including Confucius.

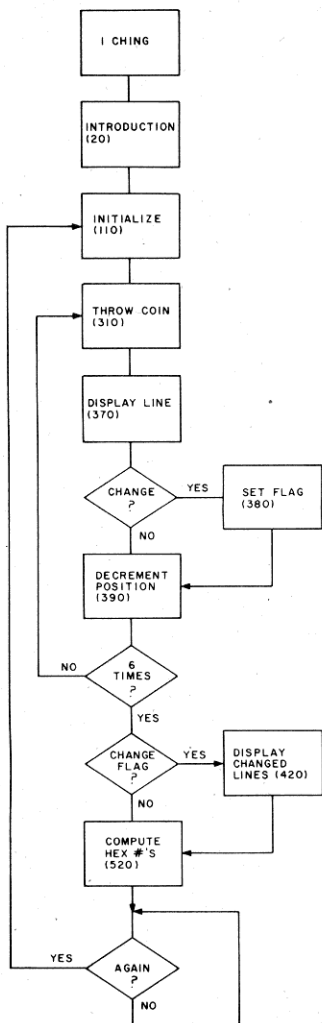


Fig. 3. Overall Program Flow-chart.

changed hexagram, skipping the "lines" part.

Electronic Throwing

Another *I Ching* method uses 50 thrown yarrow stalks—something like "pick-up-sticks." By a complicated method of subtracting various combinations, six, seven, eight or nine are again yielded to develop the hexagram.

After I was first introduced to the *I Ching* in 1968, I tested its capabilities. I built electric coins for it and to test my device one person threw pennies while I threw the electronic version. To our surprise the answer to the same question came out the same with only one changing line.

Later I gave it a real test, or so I thought, by asking a question of which it should have no knowledge. I asked, what is

electricity? I questioned its accuracy no more when it came back with the hexagram for "thunder and lightning."

When I got my first computer, a KIM-I, I wrote a coin-throwing version for it, a more tricky job in assembly language. But now, I have written a BASIC version for the TRS-80. It's less complicated by comparison because the graphics are a whole new ball game. By following the flow charts and the Listing you can see how BASIC easily does what three coins and a table are meant to do.

When I first wrote the program I considered incorporating the text. But its length is awesome and by the time you loaded the whole program, you could have gotten three coins out and have thrown two hexagrams and be starting on your third.

The BASIC Program

The present program loads in 42 seconds. The overall flow chart is shown in Fig. 3. Lines 20 and 30 of the Listing ask if you need instructions. These instructions are combined in lines 1000 to 1140. Then at 40 and 50 you have the chance to write out your question. This helps to focus your thoughts on it.

At 60 we rewrite the question at the top of the screen to give more room to the hexagram graphics. From 110 to 290 we do all the program housework, defining the shapes of the lines; C is the change flag, while Y and YC start printing the graphics. The lines are made up of strings of the TRS-80 graphic symbols so they are written very quickly.

In line 300 (see also Fig. 4) we set a loop for six lines, then in a sense, we want to "throw" three coins. What we actually want is the numbers six to nine. Here I could have used the computer's random number generator, but when we throw coins we shake them and throw them down at a time determined by one's own sense of "when." To re-create this outside influence, I set a loop at line 310 to 340 that counted from six to nine. The "throw" is determined by when you hit the space bar. L is that number.

We want to save this total for later calculations, so we set up a little D list and print the first line number near the bottom of the screen at Y along with the string for that particular line.

In line 380 we check for a changing line and set the flag if it was, then we decrement our print location and do it all over again. Simple. If you want complication you should have seen how this was done for the KIM-I display.

The Change Flag

At 410 we check to see if we had a change flag and if so, we can display a changed hexagram. From 420 to 500 we display the hexagram (see Fig. 5). We set a six count loop again at 420 and then at 430 & 440 we check our little D list to see if the number was a six or nine and this is changed to its opposite. A six or a nine must be indicated because in the text these lines are significant. For this reason we change the six or nine to a string which will be tacked on to the end of the line string when it is displayed.

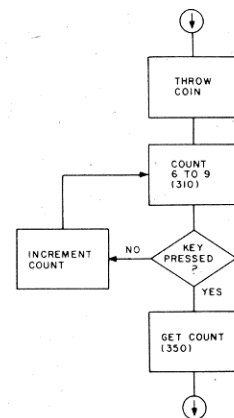


Fig. 4. Throwing Three Coins.

At 450 and 460 we get the seven or eight that's left and make N\$ a space. In our later calculations we'll need these changed hexagram lines so we save them in a C list at 470. At 480 we print the string again, decrement our print location and do it again for the next five lines.

To save the time of looking up the hexagram in a table which is at the rear of the book, we'll let the computer do it. Each hexagram has a number from one to 64 and we have to glean that

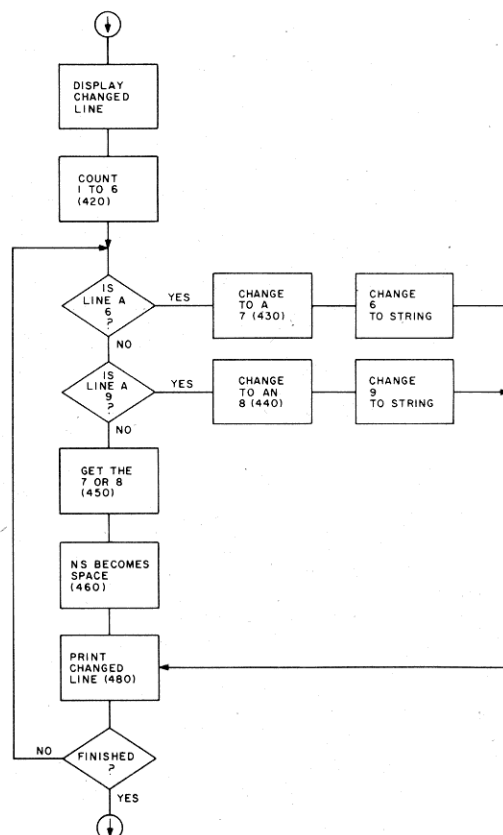


Fig. 5. Displaying the Changed Hexagram.

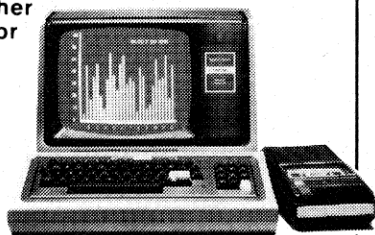
TRS-80 LEVEL II \$750. COMPLETE SYSTEM

The world's most popular microcomputer, with 16K of memory and Level II basic for only \$750, complete with full 90 day Radio Shack warranty. We accept check, money order or phone orders with Visa or Master Charge. (Shipping costs added to charge orders).

Disk drives, printers, peripherals, software & games... you name it, we've got it (both Radio Shack & other brands). Write or call for our complete price list.

C&S ✓145

**ELECTRONICS
MART, LTD.**



**AUTHORIZED
DEALERSHIP**

Radio Shack®

32 EAST MAIN • MILAN, MICHIGAN 48160 • (313) 439-1508

ATTENTION TRS-80 OWNERS*

For a limited time the C-1 case is still priced at \$69.50

At last! An attractive home for all of the parts of your system—keyboard, video display, power supply, and, last but not least, the cassette.

The TRS-80 performs as a computer — Now it can look like one.



Classic black and silver color scheme to match your TRS-80* Now your system can be portable without dismantling. The cassette recorder can easily be used along side the case and then conveniently stored in the side opening without disconnecting.

This introductory price of \$69.50 will shortly be terminated as our dealerships are set up.

DEALER/DISTRIBUTOR INQUIRIES WELCOME.

Send check or money order for \$69.50
plus \$5.00 for shipping to:

Designco ✓223

Department 1B
P. O. Box 307 • Union, MI 49130
Telephone (616) 641-5956

Michigan residents add 4% sales tax. Visa and Mastercharge accepted with signature, exp. date, and number.

* TRS-80 is a Product of Radio Shack.

Let Your TRS-80® Teach You ASSEMBLY LANGUAGE

Tired of buying book after book on assembly language programming and still not knowing your POP from your PUSH?

REMSOFT proudly announces a more efficient way, using your own TRS-80®, to learn the fundamentals of assembly language programming --at YOUR pace and at YOUR convenience.

Our unique package, "INTRODUCTION TO TRS-80® ASSEMBLY PROGRAMMING", will provide you with the following:

- Ten 45-minute lessons on audio cassettes.
- A driver program to make your TRS-80® video monitor serve as a blackboard for the instructor.
- A display program for each lesson to provide illustration and reinforcement for what you are hearing.
- A textbook on TRS-80® Assembly Language Programming.
- Step-by-step dissection of complete and useful routines to test memory and to gain direct control over the keyboard, video monitor, and printer.
- How to access and use powerful routines in your Level II ROM.

This course was developed and recorded by Joseph E. Willis and is based on the successful series of courses he has taught at Meta Technologies Corporation, the Radio Shack Computer Center, and other locations in Northern Ohio. The minimum system required is a Level II, 16K RAM.

REMASSEM-1 only \$69.95



REMSOFT, Inc.
571 E. 185 st.
Euclid, Ohio 44119
(216)531-1338



Include \$1.50 for shipping and handling.
Ohio residents add 5 1/2 % sales tax.

TRS-80® is a trademark of the Tandy Corp.

\$2900

1st 1,000
PAID ORDERS
PER PACKAGE

ALL FOUR \$9900

SOPHISTICATED ACCOUNTING SOFTWARE

**OSBORNE & ASSOC.
CBASIC, G/L, P/R, AR, AP
(4 pkgs)
CONVERSION — TRS-80**

**East Coast Office
(703) 573-7300**

**West Coast Office
(801) 225-0497**

**FULL SERVICE
ACCOUNTING & PROCESSING**

5423 Crows Nest Ct.
Fairfax, VA 22030

M/C • VISA

*Regular price \$49/\$196
Media & Manual Separate

Hyperlight Patrole Hyperlight Patrole

Space battle game with three dimensional viewing screen, graphics & sound.

The ultimate in space battle games for the Level II 48K disk only. Requires one disk and is self loading.

\$19.95

Money and cash orders sent out the same day.

Fantastic Software

3305 W. Spring Mt. Rd.
Suite 49
Las Vegas NV 89102

number from the two lists D and C.

A list of the numbers of the hexagrams were made in a certain sequence as shown in the

DATA statements from 620 to 670. These numbers could be addressed or retrieved by knowing if the line was a yin or a yang. If the line was a yang we add to-

gether a multiple of 2. We start in 520 to initialize our variables and in 530 set another count to six loop (Fig. 6).

If the lines are yins we skip the count in 540. For instance, if all the lines were yin, the counter T remains 0, then in lines 580 to 600 we only read the first number, two, which is the correct number for the hexagram consisting of all yin lines.

However, if the first line was a yang line, then we add T and A, in this first case a "1", and then double A as shown in lines 550 and 560. This whole procedure repeats six times adding and doubling for yang lines so that T can point to the hexagram number. Then in 610 we print the number under the displayed hexagram. In 705 we go through the same procedure for the changed hexagram in list C.

Finally, in 680 and 690 you

have a chance to do another hexagram by hitting the space bar again.

From yarrow stalks to BASIC programming and TRS-80 graphics, the *I Ching* knows the answer to all of your questions. I hope you have fun with the program and that you now know a little more about this fascinating book. May the changes you learn about be always for the better. ■

References:

- I Ching*, Richard Wilhelm/Cary F. Baynes, Princetown University Press.
- I Ching*, Raymond Van Over, Mentor.
- Eight Lecturers on the I Ching*, Hellmut Wilhelm, Princeton University Press.
- The I Ching and You*, Diana Pfarlington Hook, E. P. Dutton.

```

10 REM INSTRUCTIONS AND QUESTION
20 CLS:INPUT"DO YOU WANT INSTRUCTIONS (Y-N)";YS
30 IF YS="Y"THEN 1000 ELSE IF YS<>"N"THEN 20
40 CLS:PRINT"WHAT IS YOUR QUESTION"
50 INPUT QS
60 CLS:PRINTQS
110 CLEAR 60:DEFINT Y,C,D,I,L,J,A,T,H
120 DIM C(6)
130 DIM D(6)
140 DIM LS(9)
150 AS=CHR$(140)
160 BS=CHR$(162)
170 CS=CHR$(166)
180 DS=CHR$(136)
190 ES=CHR$(187)
200 FS=CHR$(132)
210 GS=CHR$(128)
220 HS=CHR$(174)
230 LS(6)=AS+AS+AS+BS+CS+DS+AS+AS+FS
240 LS(7)=AS+AS+AS+AS+AS+AS+AS+AS+FS
250 LS(8)=AS+AS+AS+GS+GS+DS+AS+AS+FS
260 LS(9)=AS+AS+AS+HS+ES+AS+AS+AS+FS
270 Y=768
280 YC=788
290 C=0
300 FOR I=1 TO 6
310 FOR J=6 TO 9
320 TS=INKEY$:IF TS=" "THEN 350
330 NEXT J
340 GOTO 310
350 L=J
360 D(I)=L
370 PRINT@Y,I," ";LS(L);
380 IF L=6 OR L=9 THEN C=1
390 Y=Y-128
400 NEXT I
410 IF C=0 THEN 520
420 FOR I=1 TO 6
430 IF D(I)=6 THEN L=7:NS=STR$(D(I)):GOTO 470
440 IF D(I)=9 THEN L=8:NS=STR$(D(I)):GOTO 470
450 L=D(I)
460 NS=" "
470 C(I)=L
480 PRINT@YC,LS(L);" ";NS
490 YC=YC-128
500 NEXT I
520 A=1:T=0
530 FOR I=1 TO 6
540 IF D(I)=6 OR D(I)=8 THEN 560
550 T=T+A
560 A=A*2
570 NEXT I
580 FOR I=0 TO T
590 READ H
600 NEXT I
610 PRINT@902,H:RESTORE:GOTO 705
620 DATA 2,24,7,19,15,36,46,11,16,51,40,54
630 DATA 62,55,32,34,8,3,29,60,39,63,48,5
640 DATA 45,17,47,58,31,49,28,43,23,27,4,41
650 DATA 52,22,18,26,35,21,64,38,56,30,50,14
660 DATA 20,42,59,61,53,37,57,9,12,25,6
670 DATA 10,33,13,44,1
680 PRINT"PRESS SPACE BAR TO DO ANOTHER HEXAGRAM";
690 TS=INKEY$:IF TS=" " THEN 40 ELSE 690
705 IF C=0 THEN 680
710 A=1:T=0
720 FOR I=1 TO 6
730 IF C(I)=8 THEN 750
740 T=T+A
750 A=A*2
760 NEXT I
770 FOR I=0 TO T
780 READ H
790 NEXT I
800 PRINT@918,H
810 RESTORE
820 GOTO 680
1000 PRINT:PRINT"TO DETERMINE YOUR I CHING HEXAGRAM YOU WILL HAVE
TO THROW A"
1010 PRINT"SYMBOLIC COIN SIX TIMES. BEFORE YOU THROW THE COIN YO
U MUST"
1020 PRINT"THINK OF A QUESTION. WRITE IT ON THE SCREEN, (ONE LIN
E"
1030 PRINT"PLEASE), THEN PRESS THE SPACE BAR FOR EACH HEXAGRAM LI
NE WHILE"
1040 PRINT"YOU ARE THINKING OF THE QUESTION. AFTER SIX LINES ARE
"
1050 PRINT"COMPLETED THE NUMBER OF YOUR HEXAGRAM WILL BE DISPLAYE
D."
1060 PRINT"IF ANY LINE YOU THREW WAS A CHANGING LINE, THEN A CHAN
GED"
1070 PRINT"HEXAGRAM WILL BE DISPLAYED ALONG WITH ITS NUMBER."
1080 PRINT"AFTER YOU LOOK UP YOUR HEXAGRAM AND READ THE TEXT, 'TH
E"
1090 PRINT"JUDGMENT' AND 'THE IMAGE', THEN THE CHANGING LINES IN
YOUR"
1100 PRINT"HEXAGRAM WILL DETERMINE WHAT SECTION OF 'THE LINES' PA
RT YOU"
1110 PRINT"READ. THEN YOU CAN LOOK UP THE CHANGED HEXAGRAM, ONLY
THIS"
1120 PRINT"TIME NO LINES ARE READ."
1130 INPUT"ARE YOU READY (Y)";YS
1140 IF YS="Y"THEN 40 ELSE GOTO 1130

```

Program Listing

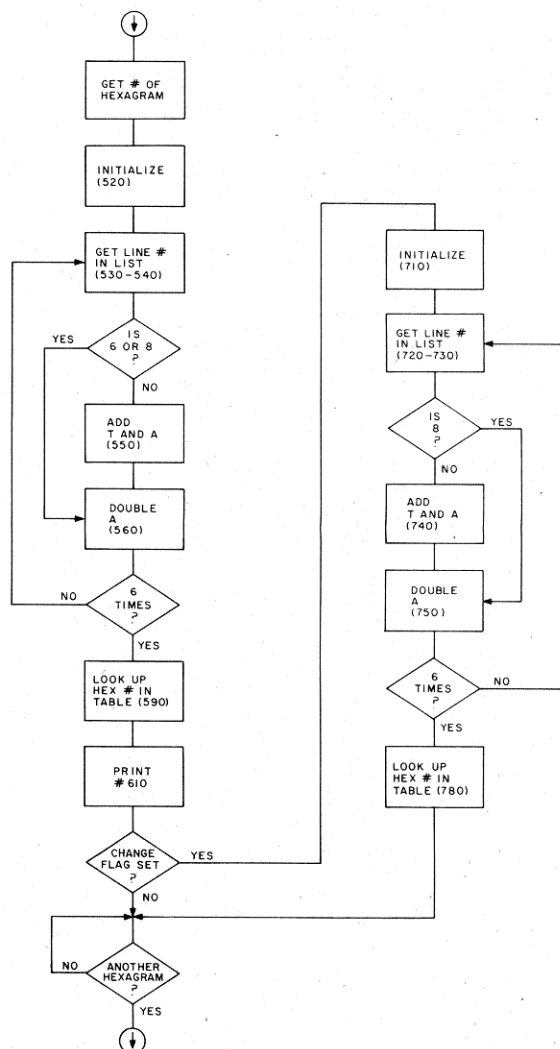


Fig. 6. Computing the Number of the Hexagram.

INTERNATIONAL ENTERPRISES INC. STATEMENT OF PROFIT/LOSS FOR PERIOD ENDING JANUARY 1978					
	CURRENT PERIOD		YEAR TO DATE		
INCOME					
PARTS SALES	157CR	16.97	20.58CR	1774.08CR	
LABOR SALES	59.34CR	641.50CR	20.58CR	2529.40CR	
GAS & OIL & GREASE	48.53CR	524.96CR	43.98CR	3712.20CR	
ACCESSORIES	0.00	0.00	0.00	0.00	
OUTSIDE WORK	0.00	0.00	0.00	0.00	
HANGER RENT	17.57CR	180.00CR	2.20CR	190.00CR	
AIRPLANE RENT	23.93CR	258.69	4.76CR	410.55CR	
SPRAYING INCOME	0.00	0.00	0.00	0.00	
OTHER INCOME	04CR	46CR	5.33CR	46CR	
TOTAL INCOME	100.00CR	1080.85CR	100.00CR	8616.96CR	
COST OF SALES					
MERCHANDISE PURCHASE	119.91CR	1296.09	42.25CR	3641.81	
CONTRACT LABOR	0.00	0.00	0.00	0.00	
GAS & OIL PURCHASES	188.36CR	2036.25	56.79CR	4893.40	
TOTAL COST OF SALES	308.27CR	3332.34	99.04CR	8534.21	
GROSS PROFIT	208.29CR	2251.46	95CR	82.35CR	
EXPENSES					
SALARIES	0.00	0.00	5.12CR	441.92	
RENT	26.83CR	298.00	6.15CR	536.00	
ADVERTISING	0.00	0.00	27CR	23.40	

INTERNATIONAL ENTERPRISES INC. BALANCE SHEET JANUARY 1978					
ASSETS					
CASH ON HAND		740.11CR			
CASH IN BANK		2190.53			
INVENTORY OF PARTS		1119.00			
EQUIPMENT		4114.50			
ACCUMULATED DEPRECIATION		.00			
BUSINESS VEHICLES		.00			
BUSINESS AIRCRAFT		20000.00			
ACCUMULATED DEPRECIATION		642.07CR			
METER DEPOSITS		.00			
TOTAL ASSETS			26041.85		

Software

We have a complete selection of disk and cassette based business software for your PET and TRS-80 computers. Call or write for free brochure.

201 Worley Rd.
Dexter, Mo. 63841
(314) 624-7611



Dealer inquiries invited.

INTERNATIONAL ENTERPRISES INC. JOURNAL JANUARY 1978					
ACCT SUB DESCRIPTION	REF #	DATE	AMOUNT	ENTRY	
230 00	000	1/78	25.82CR	20	
301 00	000	1/78	30.00CR	21	
301 00	000	1/78	358.36CR	22	
301 00	000	1/78	30.94CR	23	
301 00	000	1/78	436.27	24	
302 00	000	1/78	561.50CR	25	
302 00	000	1/78	440.00	26	
302 00	000	1/78	210.00CR	27	
302 00	000	1/78	310.00CR	28	
303 00	000	1/78	446.95CR	29	
303 00	000	1/78	900.31CR	30	
303 00	000	1/78	827.68	31	
310 00	000	1/78	140.00CR	32	
310 00	000	1/78	52.00CR	33	
311 00	000	1/78	258.69	34	

INTERNATIONAL ENTERPRISES INC. TRIAL BALANCE JANUARY 1978					
ACCT SUB ACCOUNT TITLE	REF #	DATE	CURRENT AMOUNT		
302 00	000	1/78	561.50CR		
302 00	000	1/78	440.00		
302 00	000	1/78	210.00CR		
302 00	000	1/78	310.00CR		
303 00	000	1/78	446.95CR	2529.40CR	
303 00	000	1/78	900.31CR	3187.49CR	
303 00	000	1/78	827.68		
303 00	000	1/78	524.58CR	3712.07CR	
304 00	000	1/78	0.00	00	
305 00	000	1/78	0.00	00	

WHO NEEDS IT?

Let's face it—diagnostic software is probably not at the top of your shopping list. After all, your system probably works OK most of the time. But if you want to find the cause of that occasional dropped bit or messed up disk file, or if you just want to know for sure that your system is ROCK SOLID, you need good diagnostic software.

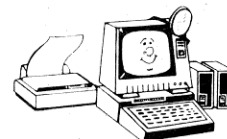
FLOPPY DISK DIAGNOSTIC—Tests every sector on every track on 1 to 4 drives, 35 or 40 track; checks drive motor speed; checks switches and index pulse sensor; 3 stepping rates; tests drive-to-drive compatibility; more! Error messages and an error summary are printed out for each drive. The January 1980 OCTUG Newsletter called this program "a significant step toward making Disk users self sufficient in diagnosing and correcting disk errors."

MEMORY DIAGNOSTIC—In addition to the usual write/read tests, this diagnostic checks refresh and verifies that each memory address is unique. The "M-1 Worm" test executes a block of machine code from each address. If your memory passes this diagnostic it is SOLID!

Both machine-language diagnostics are supplied together on diskette for the Model I TRS-80* with instructions for use and hints to troubleshooting.

PRICE: \$24.95

CA residents include 6% sales tax. Add \$1.00 P/H

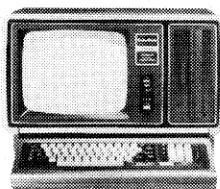


THE MICRO CLINIC

17375 Brookhurst #114
Fountain Valley, CA 92708

*TRS-80 is a registered trademark of Tandy Corp.

— TRS-80 MODEL II USERS —



Preserve — Protect — Display

your equipment with
**CRYSTAL CLEAR
PLASTIC COVERS**

- Keyboard & CRT.....\$24.95 eo
- Line printer.....\$14.95 eo

plus \$1.50 postage each
(Indiana residents add 4% sales tax)

Introductory Offer: Buy both covers & save

Combination price \$34.95
including postage

Crown Plastic Co. 160
3746 N. College 317-925-5566
Indianapolis, IN 46225



alphanetics TRS-80[®] TAPE DIGITIZER

Used by the
U.S. Coast
Guard and
U.S. Navy

ALSO AVAILABLE WITHOUT
CASSETTE REMOTE
ON/OFF SWITCH

\$54.95



- *ELIMINATES CASSETTE LOADING AND COPYING PROBLEMS... EVEN "SYSTEM" TAPES!
- *MAKES TAPE PROGRAM LOADING PRACTICALLY INDEPENDENT OF VOLUME CONTROL SETTING!
- *MAKES PERFECT COPIES OF ANY TAPE DIGITALLY WITHOUT USING COMPUTER, DIGITIZED TO EXACT REPLICATION OF TR-80'S SIGNAL WHILE REMOVING HUM, NOISE AND OTHER MINOR DROPOUTS
- *A.C. POWERED NO BATTERIES CASSETTE SWITCH ALLOWS MANUAL OR COMPUTER CONTROL OF CASSETTE RECORDER
- *FEED YOUR CASSETTE TO THE TAPE DIGITIZER AND FEED YOUR COMPUTER THE EXACT DIGITAL WAVEFORM THE TRS-80 GAVE TO THE TAPE WHILE MAKING A COPY AT THE SAME TIME!
- *THE TAPE DIGITIZER IS COMPLETELY COMPATIBLE WITH LEVEL I AND II

\$59.95

*"GOOD DATA" INDICATOR EASILY ENABLES SETTING VOLUME CONTROL FOR GOOD PROGRAM AND DATA LOADS EVERY TIME!

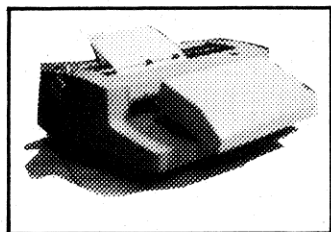
*GET RID OF YOUR TAPE BUGS TODAY FOR ONLY \$9.95 POSTAGE PAID GUARANTEED TO FIX YOUR TAPE PROBLEMS OR RETURN IN 10 DAYS FOR A FULL REFUND!

24-hour phone
(707) 887-7237

ALPHANETICS P.O. BOX 597, FORESTVILLE, CALIFORNIA 95436



'KGS-80'



KOGYOSHA

179 Riveredge Rd. Tenafly NJ 07670

DEALER INQUIRIES INVITED

A TRS-80 WORD PROCESSING SYSTEM FOR LESS THAN \$600

(If you own IBM Selectric or equivalent)

Turn your typewriter and TRS-80 into a new word processing system with a new device, the "KGS-80".

- Plug in compatible with TRS-80.
- No mechanical modification to the typewriter.
- Can be installed in 5 seconds.
- Software, a versatile Simple Letterwriter, included.

(201) 569-8769 149

SUPERIOR SOFTWARE PACKAGES FOR THE DISK BASED TRS-80

THE SMART TERMINAL • \$79.95

- TRUE BREAK KEY
- AUTO REPEAT KEYS
- PROGRAMMABLE 'SOFT' KEYS
- MULTIPAGE SCROLLING DISPLAY
- FULLY CONFIGURED FROM KEYBOARD
- TRANSMIT SCREEN, PRINT SCREEN
- TRANSMIT FILE, RECEIVE & CREATE DISK FILE
- FLEXIBLE I/O LINKAGE CAPABILITY
- MULTI PROTOCOL CAPABILITY

SPOOL-80 • \$39.95

- PRINT YOUR LISTINGS WHILE RUNNING OTHER PROGRAMS

DISPLAY+ • \$49.95

FULLY SCROLLING DISPLAY DRIVER AND HIGH PERFORMANCE KEYBOARD DRIVER USED IN THE SMART TERMINAL AVAILABLE SEPARATELY.

MICRON, INC. 73

10045 Waterford Dr.
Ellicott City, MD 21043

(301) 461-2721
MC/VISA accepted

Use this software to stop unauthorized "breaking" of your programs.

Break Disable

Jim Rastin
316 Briarhill Ave.
London, Ontario
CANADA N5Y 1N8

Have you ever accidentally pressed the break key during the execution of a BASIC program and fumed because you lost your place?

Have you ever had someone play with your TRS-80 during a demonstration and had to post a sign DO NOT TOUCH BREAK KEY?

I have, and to prevent this from happening, I wrote this program.

Although after pressing

BREAK you can type "CONT" without losing your variables, you may lose the display unless you rerun the program. But this costs you your variables! My program eliminates the effect of the BREAK key when running a program.

Listing 1 is written in BASIC although when executed it POKes into memory a machine language program (see Listing 2). But you need not know machine language to use it.

Reserve 32742 when you first power up and see MEMORY SIZE.

The program has some built-in advantages. It acts as a debounce program. Typing POKE 32763, 201 restores the break key so that if you use auto numbering to write a program,

```
10 CLS: FOR X = 32742 TO 32767
20 READ A
30 POKE X,A: NEXT
40 POKE 16526,231: POKE 16527,127: X = USR(0)
50 PRINT @ 512,"DEBOUNCE OPERATIONAL WITHOUT BREAK KEY";
60 FOR X = 1 TO 1000: NEXT
70 NEW
80 DATA 33, 238, 127, 34, 22, 64, 201, 205, 227, 3, 103, 1, 50, 0, 205, 96, 0, 124, 254, 1,
192, 62, 0, 201, 0, 0
```

Program Listing 1. BASIC

LOC.	OP CODE	MNEMONIC	COMMENT
7FE7	21 EE 7F	LD HL, 7FEE	;KEYBOARD DRIVER ADD.
7FEA	22 16 40	LD (4016),HL	
7FED	C9	RET	
7FEE	CD E3 03	CALL 03E3H	;CALL KEYBOARD DR.
7FF1	67	LD H,A	;SAVE A
7FF2	01 50 00	LD BC,0050	;DEBOUNCE DELAY
7FF5	CD 60 00	CALL 0060H	
7FF8	7C	LD A,H	;RESTORE A
7FF9	FE 01	CP 1	;COMPARE BREAK
7FFB	C0	RET NZ	;RET UNLESS BREAK
7FFC	3E 00	LD A,0	;PUT 0 IN BREAK
7FFE	C9	RET	;RETURN
7FFF	00	NOP	

Program Listing 2. Machine Language

you may BREAK out of this mode.

Type POKE 32763, 192 and the BREAK key no longer functions.

Typing POKE 32756, 1 to 255 will slow computer operation. The higher the number POKed into 32756, the slower the TRS-80 functions, as it delays for every execution performed. For example, if you POKE 32756 with 255 it takes a long time to enter any letter from the keyboard. It also runs your programs very slowly.

Typing POKE 32756, 0 returns your TRS-80 to normal speed. (The slow speed works great for debugging programs or watch-

ing a list appear on the screen.)

You can either run the program as shown and CLOAD your programs, or you can type the program omitting lines 50, 60 and 70 and place it in front of your own. It is then incorporated into one program containing all the features mentioned above.

You can vary the amount of time the debounce delay takes by typing POKE 32755, one to 200. The program first loads this memory location with 50. One word of caution—don't load this memory location with less than two. At a setting of less than ten the debounce won't be very effective. ■

UP TO 25% OFF

YOUR OWN TRS-80 SYSTEM AT TREMENDOUS SAVINGS

Visit our new Store at 20th & Walnut, Phila., PA



ITEM	REG. PRICE	OUR PRICE
Level II—4k	\$619.00	\$575.70
Level II—16k	\$849.00	\$789.60
Expansion Interface	\$299.00	\$278.00
Mini Disk Drive	\$ 495.00	\$ 385.00
Centronics 779 Printer	\$1599.00	\$1175.00
Centronics 101 Printer	\$1595.00	\$1400.00
Anadex DP-8000 Printer	\$1295.00	\$ 995.00
Memory Kit (16K) FREE INSTALLATION	\$ 149.00	\$ 98.00
Verbatim Diskettes ea	\$ 5.95	\$ 4.95
3	\$ 17.89	\$ 12.00
10	\$ 59.00	\$ 37.00
C-10 Cassettes	\$ 4.95	\$ 4.50
25	\$ 24.75	\$ 18.75
Paper (9 1/2 x 11 fanfold, 3500 sheets)	\$ 35.00	\$ 29.95

NOW OPEN
VR DATA'S Computer
Repair Center

TRS-80 MODEL II \$3626.00

- 64K RAM
- 1/2 MEG DISK

VR Data's 1st Drive \$899.00

ADDITIONAL DISK DRIVE (1ST) \$1069.50

ADDITIONAL DISK DRIVE (2ND + 3RD) \$ 558.00

BUSINESS SOFTWARE

	Model II	Model I
Payroll	\$199.00	\$99.00
General LEDGER (inc. AP, AR, etc.)	\$199.00	\$149.00
DATA BASE MANAGEMENT SYSTEM	\$249.00	\$149.00
Documentation only (each Package)	\$5.00	

GENERAL SOFTWARE

NEW DOS+	35 tk.	40 tk.
	\$99.00	\$110.00
Electric Pencil	Tape	Disk
	\$99.00	\$150.00
Upper/Lower Case Conversion	Tape \$19.95	Disk \$24.95
Diagnostics	Tape/Disk \$34.55	
Household Inventory	Disk \$19.95	
Loan Amortization Schedule	\$19.95	

APRIL SPECIAL

Good Until 4 30 80

Centronics 730	\$695.00
Centronics 737	\$950.00

NEW SOFTWARE

TPM - Model I & II
CPM Compatible
Z80 Operating System
10 Meg Removable Disk for Mod II
Send for free catalog

There are new developments every day—write or call for the latest information.

VR Data ✓31
777 Henderson Boulevard N-6
Folcroft Industrial Park
Folcroft PA 19032
(215) 461-5300



TOLL FREE
1-(800) 345-8102 *Orders only!

FOREIGN and DOMESTIC DISTRIBUTORSHIPS AVAILABLE...

New from

↑SUMWARE↓

CREATE SUPERIOR GRAPHICS & ANIMATION

Master Graphics Reference. Displays TRS-80 keyboard and graphics characters in all horizontal and vertical combinations. Thousands of shapes, screened 63 at a time. Or instantly access a specific group. People, animal, vehicle, symbol shapes you didn't believe were there. Ideal reference for animation, graphic ideas, symbology.

FLY, SHOOT, CHASE, TEE UP

Sumfun One. Eight great games in one extended program. Take off and land from "Carrier." Set "Chopper" down safely with engine out. Shoot 'em down in "Jet Attack." Net "Butterfly" in a wild chase. Play "Front 9" mini-golf. Hit "Fracshot"'s split-second target. All genuine challenges that sharpen your skill, hold your interest for hundreds of plays. Also "Dead Heat" (horse race), "Hotsy-Totsy" (number search) for family & party fun.

Programmed in BASIC for TRS-80 Lev. II, 16K. Double-load no rewind format. Top quality digital cassettes, double wide pads, stainless pins, nylon rollers, screw shells. Individually lab checked. Cased.

Each, \$16.50 Both, \$30.00
If dissatisfied, return for full refund.
Florida residents add 4% sales tax.
Order today from

↑SUMWARE↓

Suite 406 • 537 S. Sequoia Drive
West Palm Beach, FL 33401

✓217

TRS-80 MODEL II

Professional Software NOW AVAILABLE!

WORD PROCESSING: Complete editing capability including center, right, left or full line justification, tabs, margin, length & width control. Lines automatically overflow from line to line. All file specifications stored on disk. Passwords used. All printer features used (per your printer). Auto insertion of names/date etc. from other data file(s). Disk index maintained for file control. You can display index: date/time created, changed or used & brief description. System LOG used. Files can be on other disk drives. Extract & build. A chain of different files can be printed along with multi-copy control & auto insertion. Interfacing with other systems for auto-data easily done.

Requires 64K & printer of your choice.

Documentation * \$10.00 Total = \$299.00

BASIC CROSS REFERENCE: Prepares a listing of your BASIC program. Heading contains program name, date, time, & page #. All "REM" statements print ELONGATED & are easy to spot. The cross-reference report is then printed. It shows you at a GLANCE what line #'s within your program are referenced & where, all variable names used & where. Know what is available. Find DEAD spots. We wrote this for ourselves... you can use it too....!

Documentation * \$10.00 Total = \$59.99

DISK SORT: Sorts thousands of 'random file' records. Capacity is dependent on your disk space. Efficient use of strings. Sorts any data area from 1 thru 255 contiguous bytes within any part of your record. Specifications are input using the question & answer method. They can be stored & used automatically in your system job stream or you can one-shot sort. Input files are not clobbered by the sort. All stored specs can be displayed, printed or changed.

Single or multiple drives & 64K required.

Documentation * \$10.00 Total = \$69.99

COMING SOON: General Ledger, Accounts Receivable/Payable, Inventory Control & more.

CUSTOM SYSTEMS: If you have a special need, send us a letter. We can do it.

ANADIX PRINTERS. DP-9500/9501 \$1,695.00 NEW!
Send for documentation & order form.

GOOD-LYDDON Data Systems

5486 Riverside Dr., Chino, CA. 91710 ✓218

*Deductible on software purchases.

TRS-80 is a registered trademark of Tandy Corp.

QUALITY TRS-80 SOFTWARE

KEYWORD Indexing System

A series of programs that will create a data file on disc, build an index of all occurrences of "keywords" in the text of the data file and allow inquiries or searches into the file using the indexed keywords. The system features:

- flexible record lengths with location pointers
- deletion of non keywords from index by system
- "and" "or" "not" logic for inquiries
- interface for user written inquiries

KEYWORD INDEX—2 disc 32K DOS system \$39.95

SORTS for HOME and BUSINESS

No computer user should be without a versatile, easy to use sort program. The Northeast Microware in memory sort programs are written in Level II BASIC and have the following features:

- Sort ALPHA or NUMERIC data
- Sort on up to 5 fields simultaneously
- In ascending or descending sequence
- Supports kb, video or tape I/O
- Supports seq. disk and printer I/O (SORT-III)
- Supports user I/O routines
- User exits (SORT-III only)

SORT-II—16K Level II in memory sort \$19.95

SORT-III—32K DOS in memory sort \$29.95

FOR the SERIOUS GAMBLER

BLACKJACK SIMULATOR. Allows you to simulate the playing of thousands of hands of BJ and analyze the results on tape in Level II BASIC. \$19.95

Manuals for all programs available for \$3.00 ea.
(price deductible on purchase of program)

"TRS-80 is a registered trademark of TANDY CORP."

Northeast MICROWARE

BOX 6153, ✓74
SYRACUSE, N.Y. 13217

Fancy a change from Microsoft BASIC? Try CBASIC.

CBASIC Review

Ken Knecht
1340 W. 3rd St. #130
Uma AZ 85364

The CP/M disk operating system by Digital Research has been around for a long time (in microcomputer terms) and has been adapted to many systems. Several are now available for the TRS-80. I chose the one by Don French's FMG Corporation. French is the originator of the computer project at Radio Shack.

The system costs \$249 and has the CP/M disk and CBASIC. I received the package about five days after I phoned in the order via UPS. It consisted of six manuals and two disks.

The CBASIC Version Of BASIC

As I suspect a lot of the readers program in BASIC I'll give a rundown of CBASIC first.

CBASIC is a compiled BASIC, not interpreted and this has its advantages. First, you use the CP/M editor to write the program which lets you create a BASIC source code file and edits it as necessary. No line numbers are needed in CBASIC. You need a line number only as a label for a GOTO, GOSUB, etc. To continue a source code line on the next line use a line feed (␣) as in TRS-80 DISK BASIC. Unfortunately, since there are no line numbers you almost have to indent continued lines to quickly tell if they are continued lines or a new line. The ENTER key ends a line.

The statement keywords are

mostly the same as those in TRS-80 DISK BASIC with a few exceptions.

An IF statement must be entered first on a line (no nested IF's). You can't have an ELSE after an IF to a line number. You can use ELSE if the IF does anything else, such as set a variable value.

You have to DIM every array; there is no default. However, you can re-DIM an existing array without getting an error. It is advisable to null out a string array to save memory space. There are no LPRINTs in CBASIC. To print a line, enter the statement LPRINTER followed by an optional line width. To return to the display insert the statement CONSOLE. INPUT statement prompts after an LPRINTER still go to the display.

The MID\$() statement to the left of the equals sign is not in CBASIC, but still exists to the right of the equal sign. I'll miss that.

INSTR() is MATCH(). NO STRING\$() statement. I'll miss that too. MEMORY SIZE is SAVEMEM and can automatically load a file. USR is CALL. The CALL must address the address of the machine language routine.

CBASIC has only integer and real numbers. Real numbers have 14 digits of precision. The first 31 alphanumeric characters of a variable are significant. This permits long variable names with the first two characters the same as another. Very handy for self-documentation in a program.

CBASIC has no graphics and is very fussy about the difference between integers and

real numbers. You must be consistent.

New Statements

Let's take a look at the CBASIC statements not in TRS-80 BASIC.

The CHAIN statement lets you run other programs in the course of a CBASIC program. Variables can be carried from program to program with the COMMON statement. Beginning to sound like FORTRAN? You can write a program consisting of a number of other programs (or modules) with variables transferred through the COMMON statement. This, if organized properly will give you the equivalent of local and global variables. Very useful. There are a few "gotcha's" involved in this; better read the manual.

XOR is included in the statements, along with the usual NOT, AND, and OR. A WHILE statement is included. TAB statements are only limited by the console or line printer width.

A CONCHAR% statement gets a character from the keyboard and converts it to ASCII—like INSTRING\$ in TRS. FLOAT (X%) converts X% to a real number. UCASE\$(A\$) converts the characters in A\$ to uppercase. SADD%(A\$) returns the address of the string A\$. This could be useful to find the addresses of strings for a machine language sort program. Maybe you have some better ideas.

The user defined function DEF FN... can have several lines, ended with a FEND. This is not normally found in a Microsoft BASIC. PRINT USING is present with a few interesting variants.

CBASIC Disk Operations

Now to the disk file statements. Incidentally, there are no cassette file statements in this BASIC. I like the CBASIC files better. The variable record lengths save a lot of programming. There are also fewer statements to remember. FIELD, LSET, RSET, MKS\$, CVS, GET and PUT do not exist.

Files can have fixed record lengths or dynamic. RECL sets a record length. Thus:

```
CREATE "FILENAME" RECL 20 AS 1:CLOSE 1
```

creates a file "FILENAME" with a record length of 20 as file 1 with a reserved space of 128 bytes. To open the file use:

```
OPEN "FILENAME" RECL 20 AS 3
```

Note the file number can be different.

Random files must use the RECL length option. RECL can also be used for sequential files, but is not required. Up to 20 files can be active at one time without limitation on record length.

The statement:

```
FILES "FILENAME" RECL 15 AS 4
```

opens the file and creates it if it does not exist on the disk. CLOSE 1 closes file 1. There is no all inclusive CLOSE as in TRS-80 DISK BASIC. Each file must be closed by number. Closing a nonexistent file gets you an error.

In random files the RECL takes the place of the FIELD statements. As long as the variables entered into the file (numeric or string) fit in the record length there are no problems. You can store formatted statements, like PRINT USING, as random or sequential. There are

many options, see the manual for details.

CBASIC Advantage

Records of varying lengths are the great advantage of the CBASIC file system. This saves the complicated stepping through the 255 byte TRS-80 DISK BASIC record to find the record you want or an empty record. This can also eliminate numerous possible mistakes. It is also nice to be able to store numeric data in a file without having to convert it to string with STR\$() or MK\$(). You don't even have to remember how you stored it, just read it back as real or integer. This eliminates getting back a string of graphic symbols when you expected a number.

In CBASIC you can also append data to a sequential file using PRINT # X at the end of the file. In TRSDOS 2.1 the APPEND doesn't work. If you remove a disk and replace it with another, in CBASIC you have to use the statement INITIALIZE after each disk change. You can DELETE a file in CBASIC as well as RENAME a file. This is not possible in TRS-80 DISK BASIC. You can use KILL in TRSDOS BASIC but it doesn't always work.

The second major advantage of CBASIC is its compiler, which catches all the syntax errors for you. You can correct errors before you run the program. In CBASIC writing a long program in modules and testing them individually is the best method. Of course, it isn't easy to write programs in self-supporting modules. At least not for me. A %INCLUDE statement can be used in the program to add other subprograms when compiling. This makes programming THE CP/M EDITOR in modules simple.

Some Disadvantages

I mentioned earlier how easy it is to put data into a file without a FIELD statement. However, in CBASIC the data takes up more room. To use the example of storing a part number (5 character string) and a quantity (integer), in TRS-80 DISK BASIC this takes up only 7 bytes, 5 for

the part number and 2 for the integer. In CBASIC you use 15 bytes:

```
"A1000", 24150 LF CR
```

Note the extra quotes, the comma, 3 extra bytes for the integer, and two bytes of the line feed, carriage return. In longer records the penalty is not so great, but no matter how you look at it, CBASIC uses more disk space.

The ease of accessing data from the variable file lengths far outweighs this disadvantage. You can't believe how often this eliminates program bugs until you try it. These variable file lengths can save space too, if the subrecord length is not a multiple of 255. You be the judge.

Changing a CBASIC program requires that you edit the source code (call the editor and load the file into memory), recompile the program, and run it again, usually several disk changes in a long program and this, too, is a disadvantage. Neither can you break into a program while it's running to see what's in the variables or throw in a TRON. You have to TRACE function, but it isn't quite as easy to use. If the program crashes, it's back to the editor for you and another compile to print variables.

CP/M Disk Operations

What about the CP/M DOS? A versatile system and fairly easy to learn, CP/M DOS includes many more options than TRSDOS. Much information on how to customize CP/M for your system is found in two of the manuals, but I found them heavy going.

The CP/M DOS is a powerful system and once you learn all the features it rivals a large computer's operating system. The beauty of the system is its effectiveness at the beginner's level, while challenging the experienced user. If you are like me, you have to read the manual, work with the system, read the manual again and work with the system, etc., until the whole manual makes sense. Then you've arrived! All you have to do is remember it.

Control P prints any further in-

formation typed to the display. Another control P will stop the line printer echo. Thus you can print the directory, etc. with this option.

The TYPE command lists the contents of any file. STAT and DIR do what FREE and DIR do in TRSDOS. The PIP command in CP/M moves any file from disk to disk or to the line printer. ERA is the equivalent of KILL in TRSDOS; REN the equivalent of RENAME.

In CP/M the ERA has many options. You have a FORMAT in this version of CP/M, and PIP provides the same function as BACKUP. To move the CP/M DOS from disk to disk takes two commands, MOVCPM and SYSGEN. MOVCPM also allows you to reconfigure CP/M to a different memory size. This is not needed for TRSDOS.

Information about ambiguous file names found in the CP/M manual is useful to the experienced programmers. I use a few of them and expect to employ this feature more as I grow accustomed to the system.

The SAVE command moves any number of 256 byte blocks of data from memory to the disk. DUMP prints the contents of any file in HEX. LOAD converts the assembler output file (object code) into a command file. A command file runs by typing its name in answer to the DOS prompt. It's simple to write your own command programs.

Three of the CP/M programs deserve a more detailed description, the editor for example. The editor writes the source code for the assembler, CBASIC, and to write ASCII files, such as data for a word processor. Saving and loading program files is simple and the editor maintains the previous version in a backup file in case you really mess up the editing or delete parts of the file to make a module.

The actual editing is difficult, controlled by many commands. I'm sure it will be a good editor once I fully understand the commands.

I miss the TRS-80 editor though, it did a lot of things for you automatically that the CP/M

editor requires you to do manually. For example, when moving to a specific point in a line (S in TRS; P in CP/M), the TRS-80 editor prints out the part of the line passed over. The CP/M editor doesn't, unless you ask for it (OT). If you erased the end of a line in TRS-80 (H command), you retained the CR LF. In CP/M the K command also erases the CR LF so the next line is tacked onto your edit point.

But there are many advantages to the CP/M editor. You can find a given group of alphanumerics anywhere in the program on any line with a single command. You can search for every occurrence of a specific group of alphanumerics and replace it with another group.

The CP/M Assembler and DEBUG

The assembler is an 8080, not a Z-80. I generally have trouble with assemblers but this one works well and is easy to use. It has the usual options, pseudops, and rules for syntax.

The DDT is a debugger with many useful features. It replaces the TRSDOS program DISKDUMP, placing a named file into memory and reading it out in blocks, in HEX and ASCII. You can input an assembly language program with absolute addresses and it assembles it for you.

It performs the traditional debug feat of running a program from any address and inserting breakpoints. DDT also disassembles a program in part or entirely. You can examine and change individual memory addresses and the CPU registers. DDT also prints addresses as it traces a program.

The New User Tries It Out

When I first got the system I tried to copy the CP/M and CBASIC disks I had received for safety's sake. I followed the directions, using a newly degaussed diskette, but the files wouldn't move. After trying several disks and drives I formatted a disk with TRSDOS and used it for the blank. The program went through the motions, but the moved files didn't run. I

was getting warmer. I researched the file directory and found the answer: **FORMAT!** This program was not mentioned in the manuals. I used it on a blank disk and had no further problems.

The next problem was continuing lines in the editor. The manual said to use the "****". This is not on the TRS-80 keyboard, but "**^**" works instead. That's logical. This is the symbol used in TRS-80 BASIC. As the editor gives every line a number and the "**^**" does not echo sometimes it is difficult to tell if a "**^**" or a carriage return was used when a file was created. I solved the problem by indenting all continued lines to distinguish them. The next problem was finding a substitute for the "**↑**" in a power statement, ie, 2f3. The "**↑**" on the keyboard doesn't work, although the symbol it prints in CP/M, the "**→**", has the correct ASCII code. I also tried **SHIFT↑** which prints "**↑→**". This didn't work either. I'm still wait-

ing for FMG, Corp. to answer this. One other problem that FMG is handling: I can't make the **DEF FN ...** with **FEND** compile correctly.

An idiosyncrasy of the compiler is that it only prints out lines up to 80 characters long in its listing. This is verified in the manual. It sees and correctly compiles the remainder of the line but doesn't list it. I don't understand why. It is a nuisance when the compiler gives you a syntax error in a part of the line it doesn't display. Oh yes, the compiler prints out all errors it finds when the compilation takes place. This can save program crashes later when running the program. I think the compiler runs slowly.

The compiler seems to generate DL errors when they do not exist as artifacts of other errors. The DL error means a duplicate line number exists. This can be annoying; I have had listings showing a DL error after 75% of the line numbers, though there

were no duplicate lines. The answer seems to be to clear up all the other errors and the DL errors will go away by themselves.

In contrast to TRSDOS, I have not encountered one disk problem or error using CP/M, and do not get any double letters from keyboard bounce. But if I switch back to TRSDOS I still have the usual disk problems—disk I/O errors, bad saves, etc.

In my judgement it is easier and faster to create and debug a program using a BASIC interpreter, but a compiled program runs faster and the initial weeding out of syntax errors saves later debugging problems. In addition, compiled BASIC allows you to sell a program supplying only the intermediate code. This protects the source code of the program.

Disk routines are more easily written in CBASIC. I like the system, but hate the time it takes to go back to the editor to edit a program, recompile it and run it again after you make a

change. I also miss being able to access the variables during program debugging by simply breaking the program and printing the variables. But that is the essential difference between a compiler and interpreter.

Customer Support

So far I have had excellent help from FMG Corp. French is very knowledgeable about the TRS-80 version of the system (he wrote the conversion). He also returns phone calls.

One afternoon when there was no one at FMG who could help me I tried calling Digital Research, the company who sells CP/M. Not only were they rude, but their Software Systems won't even admit to having a phone.

I suspect other versions of CP/M compatible BASICs will soon be available for the TRS-80, perhaps an interpreter.

The address of FMG Corporation is PO Box 16020, Ft. Worth TX. 76133. ■

\$1.25 PER COPY

Computers & Gambling Magazine**

**PRESENTS:
PROBABILITY
HANDICAPPING
DEVICE I**

**A TRS-80* LEVEL II BASIC PROGRAM FOR:
HORSE RACE HANDICAPPING!**

****BE A WINNER: READ COMPUTERS & GAMBLING MAGAZINE
SAMPLE ISSUES \$1.00**

This amazing program was written by a professional software consultant to TRW Space Systems, and is being introduced by the publishers of Computers & Gambling Magazine. "PHD-I" is a large complex level II program requiring a full 16K. It is carefully human factored for easy use. PHD-I is a comprehensive horse racing system for picking overlays in thoroughbred sprint races (less than 1 mile). This system has been tested using hundreds of races from the daily racing form for both major and minor tracks in the U.S. It consistently yields a **large positive return**. Detailed printouts of our statistics are available. This program features:

- Automatic keyboard debounce
- Verification display of each horse's parameters prior to entry for easy error correction.
- The win probability and correct odds for each horse.
- Bubble-sort routine for final display
- Line printer output option
- Complete users manual with examples and tips on betting and money management.

Sit down with your TRS-80* and the daily racing form the night before the race and answer 5 or 6 questions about each horse's past performance. The computer then accurately predicts the win probability and odds-line for each horse allowing you to spot overlaid horses while at the track. The users manual contains a complete explanation of overlay betting.

**ORDER NOW AT THIS SPECIAL INTRODUCTORY PRICE AND
RECEIVE A COPY OF OUR MAGAZINE ABSOLUTELY FREE!**

PHD-I 16k Level II Cassette **\$19.95**

Make checks payable to:
Joe Computer
22713 Ventura Boulevard, Suite F ✓ 193
Woodland Hills, Calif. 91364

*TRS-80 is a registered trademark of Tandy Corporation




5 1/4" Diskettes	10	50	100
3M-744-0	3.15	2.95	2.85
Verbatim 525-01	2.65	2.45	2.30
8" Diskettes			
3M-740	3.05	2.85	2.75
8" Double Density			
3M-741	4.15	3.95	3.80

Diskette Storage Pages 10/3.95
Plastic Library Cases 5" — 1.95 8" — 2.85

CASSETTE TAPES — Agfa PE 611
Premium quality in superior 5 screw housing.

C-10	10/5.65	50/25.00	100/48.00
C-20	10/6.90	50/30.00	100/57.00

TRS-80 Adventures by Scott Adams
Machine Language Classics for 16K.
Seven Adventures currently available.
SALE! \$12.90 each, 3 for \$35.00.

NEW SARGON II Chess (TRS-80 cassette)
regular price \$29.95 — our price **\$24.90**

Add \$1 per order for shipping. We pay balance (UPS surface) on all prepaid orders.

"TRS-80 is a registered trademark of TANDY CORP."

A B COMPUTERS
115 E. STUMP RD.
MONTGOMERYVILLE, PA. 18936
(215) 699-8526 ✓ 81

WRITE FOR COMPLETE CATALOG

PUT YOUR TRS-80* TO WORK! SET TYPE!

SAVE the TIME and EXPENSE of having copy re-keyboarded. You compose text for books, publications, catalogs, price lists, directories, reports, etc. We convert it to high-quality phototypesetting!

FAST SERVICE. BIG SAVINGS.

Five user-specified type faces and fourteen sizes on line. Change faces or sizes within a line. Line lengths to seven and one-half inches. Set type flush to the left or right, centered, or justified. Automatic insertion of space or leaders. Special characters. More.

SIMPLE COMMANDS.

TRS-80* with lower case modification and The Electric Pencil** are required. Text files may be transmitted via telephone with optional disk drive and modem for even faster turnaround time.

Our **Manual For Microcomputer Type-setting**, which includes instructions, examples and type specimens is \$50.00. Shipped within 24 hours. Return within 10 days for full refund if not satisfied. VISA and MASTER CHARGE accepted: give card number and expiration date.

BROWN GRAPHIC PRESS
2488 Summit Street, Columbus, Ohio 43202
614/262-3491 ✓ 94

Text for this ad was composed on a TRS-80*

*TRS-80 is a trademark of the Tandy Corp.
**THE ELECTRIC PENCIL is a trademark of Michael Shryver

*A BASIC program to turn your
Level II into an intelligent terminal.*

BASIC Terminal

*Terry Noreault
Computer and Info. Studies
Colgate University
Hamilton NY*

One use of the home computer that has been incompletely explored is its ability to communicate with remote computers. The personal computer can be used effectively as an intelligent terminal. It can also be given hard-copy capability through this communication link. This article will review the Radio Shack hardware and software for communication and detail a design of intelligent terminal software.

Hardware and Software

The hardware to modify a TRS-80 to use the software detailed in this article is:

1. Expansion interface
2. RS-232-C interface board
3. Telephone interface I or II
4. Level II with 16K

The RS-232-C interface board comes with an object code program on cassette that enables the TRS-80 to operate as an ASCII terminal. This program

makes an excellent base for designing a versatile communication system. The manual accompanying the interface board ("TRS-80 RS-232-C Interface Board Manual," Radio Shack, 1979) is a clear, concise and thorough introduction to the capabilities of the interface board. The manual contains

Modification of the terminal program will be easier if the source code is patched using an editor/assembler. All the patches described in this article to the Radio Shack terminal program are to the source code and not the object code. Source code patches are easier and well worth the cost of an

features that have been designed into the system. Each of these commands will be discussed in detail.

Commands

Terminal. In the terminal mode, the home computer is used as if it were an ASCII terminal. The user may return from this program to the BASIC control program using a control-Y. The communication link with the remote computer is maintained after exiting from the terminal program. The communication with the remote computer can be resumed at the point that the user exited from the terminal program upon reentry to the terminal program.

Basic. After returning from the terminal program, the command BASIC will cause an exit to the BASIC monitor. After returning to the BASIC monitor, a user may use any of the capabilities of the home computer. One feature of interest is the ability to use the home computer in calculator mode. All of this is accomplished without disturbing what is being done on the remote computer.

By making a modification, the

**This program makes an excellent
base for designing a versatile
communication system.**

source listings for the terminal program and an LA36 printer driver.

One minor problem with the manual is the discussion of how to set the DIP switches. These switches control the baud rate, number of stop bits, word length and parity. It nicely details whether the switch should be opened or closed. But, the manual neglects to mention which way is open or closed. The DIP switch, when down on the right side and facing the front of the expansion interface, is open.

assembler.

Intelligent Terminal

The BASIC program listing presented here gives the user the ability to issue five different commands. These commands allow the user to 1) switch between the terminal program and the BASIC monitor, 2) enter text for later transmittal, 3) transmit previously entered text and 4) change special characters. Fig. 1 shows the relationship of these features:

This program allows switching among the various

line printer/driver routine output can be directed by LLIST or LPRINT to send output to the remote computer. If the remote computer is left in input mode in a text editor, the line printer output will be directed into a file. This capability allows the hobbyist with access to a remote computer to use his line printer for hard copy. One minor problem: While the home computer is transmitting, the host should not respond or characters will be lost. The interface board does not seem to be able to handle concurrent I/O.

Enter. This command allows up to 8K bytes of text to be entered and stored in RAM. This could be modified to store the text on tape or disk if desired.

The purpose is to store the text for transmittal to the remote computer at a later time.

It is a simple text editor. It has an Exit " " and can back up in the text " ", deleting characters as it goes. At present, this is satisfactory for typing rough drafts. A better editor could be designed.

Text. This command enables the text from ENTER to be transferred to the host computer. All the characters in the ENTER buffer will be transferred to the remote computer. The remote computer must be ready to receive and store the text.

Change. One problem with the TRS-80 is that it is not a full ASCII keyboard. There are some characters that are not normally

```

30000 PRINT "WELCOME TO TERMINAL PROGRAM"
30010 PRINT "OPTIONS ARE"
30020 PRINT "  1) TERM - TO USE AS A TERMINAL"
30030 PRINT "        USE CONTROL-Y TO RETURN"
30040 PRINT "  2) BASIC - TO RETURN TO BASIC MONITOR"
30050 PRINT "        A) RUN BASIC"
30060 PRINT "        B) USE LLIST COMMAND"
30070 PRINT "  3) ENTER - ENTER TEXT TO BE TRANSMITTED"
30080 PRINT "  4) PRINT - PRINT TEXT FROM 'ENTER'"
30090 PRINT "  5) CHANGE - CHANGE CHARACTER CODE FOR "
30095 PRINT "        CONTROL-D"

30110 INPUT "ENTER OPTION":A$
30120 IF A$="BASIC" THEN END
30130 IF A$="TERM" THEN 30200
30140 IF A$="ENTER" THEN 30300
30150 IF A$="PRINT" THEN 30400
30160 IF A$="CHANGE" THEN 30500
30170 GOTO 30020

REM Change address for line printer driver
REM and initialize user call for terminal program.

30200 POKE 16421,2
30210 POKE 16422,0
30220 POKE 16423,127
30230 POKE 16526,0
30240 POKE 16527,112

REM call terminal program

30250 A=USR(0)
30260 GOTO 30110

REM text entering procedure

30300 FOR I=20479 TO 28671
30310  A$=INKEY$
30320  IF LEN(A$)=0 THEN 30310
30330  PRINT A$
30340  IF ASC(A$)=24 THEN I=I-1:GOTO 30110
30350  POKE I,ASC(A$)
30360  IF ASC(A$)=ASC(" ") THEN 30380
30370  NEXT I
30380  PRINT "END OF INPUT"
30390  GOTO 30110

REM Transmit text from ENTER to remote
REM computer which must be ready to
REM receive input

30400 FOR J=20479 TO 28671
30410  A=PEEK(J)
30420  IF A=ASC(" ") THEN 30450
30430  LPRINT CHR$(A):
30440  NEXT J
30450  PRINT "END OF OUTPUT"
30460  GOTO 30110

REM Change special code for
REM control-D

30500 INPUT "ENTER CHARACTER CODE, IN DECIMAL.":A
30510 POKE 28893,A
30520 PRINT "CONTROL-D IS NOW CHARACTER CODE ":A
30530 GOTO 30110

```

Program listing.

```

63      PUSH  BC
        CP    40H      ;is character
        JP    M,EXIT   ;upper or
        CP    7BH      ;lower case
        JP    P,EXIT   ;if so
        CP    5BH      ;convert case
        JP    M,LOWER
        CP    61H
        JP    M,EXIT
        ADD   A,20H     ;LOWER TO UPPER
        JP    EXIT
        ADD   A,20H     ;UPPER TO LOWER
        JP    CIO$
        LOWER
        EXIT

```

Fig. 1.

transmitted. The Radio Shack software solves this problem by trapping four codes (1H to 4H) and replacing them with user-defined codes.

Occasionally, there is need to add more than four new codes. This command allows the code associated with control-D to be changeable. It is a little inconvenient but better than making the modification using T-BUG.

Enhancements

These commands allow the user to use both the power of the home computer and the remote computer to their maximum benefit. Other features that can be added are:

- 1) the ability to trap incoming signals to permanent storage on the home computer
- 2) improved text-editing capabilities
- 3) keyboard modification of baud rate, parity, word length and number of stop bits for the RS-232-C interface

All of these features and enhancements have or can be accomplished without modification of the remote computer. Special software need not be developed for the remote computer.

Patches

Return to BASIC. The first patch is to enable the terminal program to be called and exited as a subroutine from BASIC. This is accomplished by trapping a control-Y, which signifies a return. The following assembler accomplishes the return to the control program. The line numbers are the line numbers in the Radio Shack terminal program.

```

37      JR    Z,INS
        CP    19H      ;is it Y
        JP    NZ,OVER  ;if not continue
        RET           ;else return
38 OVER CP    05H

```

Case change. One fortunate feature of the TRS-80 keyboard is that it generates both upper and lowercase character codes. An unfortunate feature is that they are reversed. The upper-case is generated when the shift key is *not* depressed; lowercase occurs when the shift key is depressed. This can be overcome by simply reversing the case before the character is transmitted. The following patch accomplishes this.

The terminal program has been relocated to 7000H to allow more room for BASIC programs that are to be printed using LLIST. This is accomplished by changing the ORG setting in the assembler program.

Line printer driver. All this program does is to take a byte and send it to the output section of the terminal program. The driver moves the byte from one register to another. The output will be at whatever the baud rate of the communication link is:

```

ORG     7F00H      ;line printer driver
LD      A,C        ;move character
CALL    SOUT       ;transmit character
        RET
END      7000H     ;entry to term. prog.

```

Conclusions

The home computer offers the user a flexible communication link to a remote computer. The link can be molded to perform specialized functions, i.e., perform complete logic including account number and password. The possibilities are limited only by your resourcefulness. ■

TRS-80®**DISK FILE MESS?**

Find disk files instantly with the most sophisticated disk indexing program available. Similar Indexing programs exist but none with as many features as FINDISK-II!

- AUTOMATICALLY create, sort, print, search a Master Index of all disk files.
- AUTOMATICALLY read file names, disk numbers (no hand entry).
- AUTOMATICALLY print disk labels (optional).
- AUTOMATICALLY update Index from revised disks.
- AUTOMATICALLY add optional file descriptions.
- AUTOMATICALLY purge disks of unwanted files.

• **FINDISK-II** (on tape or disk, 32K min) \$20.00

Other powerful programs from Documan available on tape or disk:

- **STRUCT-I** beam design and moment transfer w/graphics (16K) \$15.00
- **SOLAR-I** essential calculations for passive solar design (32K) \$30.00
- **RIA-I** complex analysis of real estate investments (32K) \$30.00
- **DEPRECIATE-I** calculate, print 12 facts on depreciable items (16K) \$10.00

✓ 88

VISA OR MASTER CHARGE

DOCUMAN SOFTWARE BOX 387-A KALAMAZOO, MI 49005 (616) 344-0805

Call us, Write us, or Circle our reader service #

If you like to receive mail related to the TRS-80® Model I or Model II, then send us your name and address. Companies and individuals all across the country have products and programs they want to tell you about. Products that will enable you to use and enjoy your computer more.

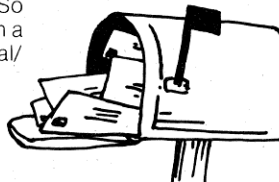
Each day a trip to your mailbox can bring you useful, interesting information on accessories, business programs, game programs, hardware, supplies, etc.

And by mailing directly to you the companies can go into greater detail on their products and services. So send your name and address today. Tell us if you own a Model I or Model II and if your interest is in personal/hobby or business use.



TRS-80® Reg. Trademark of Radio Shack

✓ 216



National Tricor, Inc./3335 Greenleaf Blvd./Kalamazoo, MI 49008/616-375-7519

MANAGEMENT SYSTEMS SOFTWARE**ANNOUNCES****TWO NEW BUSINESS PROGRAMS FOR THE SMALL BUSINESSMAN**

BY

JEROME S. OSTERYOUNG, PH.D.

RENOWNED BUSINESS EDUCATOR AND AUTHOR OF 5 BUSINESS TEXTS

PROFORMA CASH-FLOW PROGRAM

FORECASTS CASH NEEDS AND LIQUIDITY

FOR UP TO 12 PERIODS

\$125.00

EXTENSIVE DOCUMENTATION WITH EACH PROGRAM

CASSETTE OR DISK

WRITE FOR BROCHURE

*** LEASE-PURCHASE PROGRAM**

EVALUATES LEASE VS PURCHASE DECISION

INCORPORATES LATEST TAX IMPLICATIONS

\$100.00

MANAGEMENT SYSTEMS SOFTWARE

P.O. BOX 10673, ST. PETERSBURG FL 33733

(813) 864-4347

✓ 87

Medoffice™

The state of the art in small systems medical office programs. Pascal software for the TRS-80*, PDP-11*, and many others.

From the medical software specialists:

PATIENT CARE DATA SYSTEMS

418 North Main St., Penn Yan, New York 14527

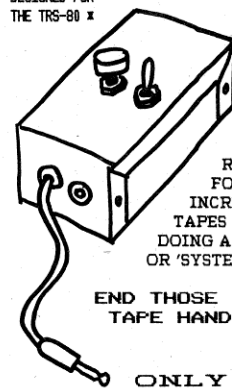
315-536-3734

*TRS-80 is a trademark of Radio Shack, a division of Tandy Corporation
PDP-11 is a trademark of Digital Equipment Corporation.

✓ 96

From The
Engineering Group
At GSIC:

DESIGNED FOR
THE TRS-80 x

**CASSETTE
REWINDER
INTERFACE**

NOW YOU CAN
REWIND, FAST-
FORWARD, OR
INCREMENT YOUR
TAPES EVEN WHEN NOT
DOING A 'CLOAD', 'CSAVE'
OR 'SYSTEM' COMMAND.

END THOSE CASSETTE
TAPE HANDLING BLUES!

ONLY .. \$14.95

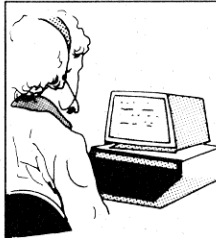
WE PAY ALL SHIPPING AND HANDLING CHARGES.

FEATURES: Adapts instantly to present system, precision toggle and momentary push-button switches, durable painted aluminum cabinet, high quality micro-plug and jack, non-slip rubber feet, does not interfere with normal system operation, compact design complements your system.

SEND CHECK OR MONEY ORDER TO: ✓ 93

GRANITE STATE
INSTRUMENT COMPANY
Box 3486
Nashua, NH 03061

(X) TRADEMARK OF TANDY CORPORATION

**Talk
to
your
TRS-80**

Now, Scott VET/I, an exciting new product of Scott Instruments, permits you to talk to your TRS-80, allowing voice control of basic programs or games. The Scott VET/I offers:

- User initialized vocabulary of up to 40 words
- Fast recognition
- High accuracy
- Demonstrated performance comparable to systems costing \$10,000 or more at hobbyist prices.
- Multiple user Capability with no increase in storage requirements
- Easy to train and use (user programs can be written in Basic)
- Requires TRS-80 (c) Model I with expansion interface, 16 K of additional memory and dual disk drives/cassette (c) Trademark of Tandy Corporation

For more information call
(817) 387-1054 or write

**scott
instruments**

815 North Elm, Denton, Tx. 76201

✓ 91

Five tapes from a major micro book publisher reviewed by 80's man in Africa.

dilithium Tapes

Rod Hallen
State Dept.-Accra
Washington DC 20520

I want to pass along my thoughts about some interesting new programs for the TRS-80 which have come to my attention. I'll try to be objective enough in my descriptions so that you can make up your own mind. Even if some of these don't appeal to me, I'm sure that many of you will feel differently than I do.

These five tapes are new from dilithium Press, PO Box 92, Forest Grove OR 97116. Up until now, dilithium has been a book publisher of many microcomputer books. Write for their catalog. As far as I know, this is their first venture into the taped software field, and I think that they have made a good beginning. By the time that you read this, these tapes in their bright red packages should be appearing at computer stores. All five of these tapes are for the 16K

Level II TRS-80, although most of them will run in 4K. The price per tape is \$9.95.

The first noteworthy feature of these tapes is their ease of loading. I have run across many tapes that were quite particular as to volume level. In fact, I have had to use my Data Dubber from The Peripheral People to load many cranky tapes. Such was not the case with the dilithium tapes. All loaded at my normal playback volume setting without any trouble at all.

The tape numbers used below are assigned by dilithium and appear prominently on the package, which is a large card with a plastic holder stapled to it. The plastic holder, in turn, contains a standard plastic tape box with the individual instruction card inside. The instructions for all five tapes are also printed on the back of each card.

Tape # 1

Applications—contains six programs designed to provide assistance in various areas of personal life.

Biorhythm is a familiar program, that appears to work well. It asks for the usual information and then prints out the standard chart for ten days. If you tap the space bar, it will print out an-

other ten days by blanking the screen and starting at the top again. This can continue indefinitely. I would have preferred a scrolling chart, but that is a minor complaint.

Checkbook performs the normal monthly checkbook-balancing routine. The prompt messages help to keep you on the track.

Decide is the jewel in this collection. It is designed to help you reach a decision on some course of action or on the purchase of some item. It asks for the different courses or items involved and then has you input the best reasons for each possible choice. Reasons are weighted, and the final decision is determined by the number of points received. The best part of Decide is that it forces you to look more deeply into a decision before making it.

Loan figures your monthly payment given the amount, interest rate and number of months to pay off. It prints a monthly breakdown so that you can see how much is going to the principal, how much to interest, and what the total interest paid to date is. You can also input a larger payment to compare how much quicker the loan is paid off and how much less it costs. This runs much

slower than a similar program that I wrote some time ago.

Mileage maintains a record of your gasoline usage. You enter the date, odometer reading and number of gallons each time that you fill your tank, and pertinent data will be stored in a tape file. You can then call the file at any time for a breakdown of your gasoline (or diesel fuel) usage and the miles per gallon you are getting.

Questionnaire is used to grade multiple-choice-type exams or questionnaires. As such, it will probably be of most interest to teachers. I found it a little difficult to get into because the instructions are pretty slim, but some practise will help with this one.

There is a little something here for everyone. You'll have to decide if any of it is for you. I think Decide alone is worth the price.

Tape # 2

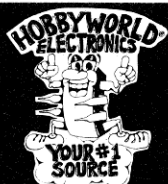
Educational—has some programs for children and some for all ages. I'll let you guess which is which.

Arithmetic gives you a choice of addition, subtraction or multiplication—easy, medium or difficult problems—and then prints four problems on the screen at one time. When you

HOBBY WORLD[®] ELECTRONICS

✓ 23

America's Largest Mail-Order Computer Store



CALL TOLL FREE:
(800) 423-5387 USA

IN CALIF:
(800) 382-3651

LOCAL & OUTSIDE USA
(213) 886-9200



16K MEMORY ADD-ON \$75 2 for \$140

For TRS-80, Apple, Exidy
Installs in minutes, no special
tools required. Complete with
detailed instructions. Wt 4 oz.
Cat No. Description
1156 For TRS-80 keyboard
unit
1156A TRS-80 without but-
tered cable
1156B TRS-80 with buffered
cable
1156C For Apple
1156D For Exidy Sorcerer

HUB REINFORCING DISK PROTECTORS

- Protects disks and diskettes from wear!
- Repairs damaged disks!

Now you can save those "ruined"
disks with simple insertion of our
DISK PROTECTOR! Inserting a pro-
tector on a new disk will increase its
life times over! Easy to install, just

slip a protector ring onto the preci-
sion tool, then slip on the disk! No
glueing, no drying time, no heat!
One tool lasts indefinitely, each
disk requires one protector ring.

Cat No.	Description	Wt.	Price
2073	5 1/4" diskette tool	2 oz.	\$4.95
2074	5 1/4" diskette protector rings	3 oz.	50 for \$9.95
2075	8" disk tool	3 oz.	\$6.95
2076	8" disk protector rings	4 oz.	50 for \$13.95

8" Disks

\$37 box of 10

- IBM compatible
- Single density
- Individually certified

Cat No. 1145 Type 32-1000
Description
32 sector holes, 1-index hole

Cat No. 1146 Type 34-1000
interchangeable with IBM32,
3740, 3770, 3790, etc.

TIELINE

Programma
Turns your TRS-80 into a
timeshare mainframe, smart ter-
minal, and allows you to
send/receive BASIC and data via
phone. Requires modem, RS232,
32K, DOS 2.1 or later.
Cat No. 2137 \$6.95

HUNT

Programma
A new class of game where you
invent your own characters,
rules, and so on. All the best of
Adventure, Dungeon, Quest,
Dragons all rolled into one!
Cat No. 2145 TRS-80 L2, 16K \$19.95

BRIDGE CHALLENGER

You and dummy play against the
computer in regular contract
bridge. Either you or comp sets
up.
TRS-80 L2, 16K
Cat No. 1195 \$14.95

Sargon Chess

Winner of all tournaments! 6 levels
of play, excellent graphics.
TRS-80 L2, 16K
Cat No. 1093 \$19.95
Apple II, 16K
Cat No. 1317 \$19.95

STAR TREK III

The most advanced version
we've seen!
TRS-80 L2, 16K
Cat No. 1041 \$14.95

BARRICADE

Similar to breakout. A real time
game, with options of speed,
balls, angle, etc.
TRS-80 L2, 16K
Cat No. 1362 \$14.95

LEVEL III BASIC

Gives your TRS-80 the power of
a full size system. Disk com-
mands, advanced editing, etc.
TRS-80 L2, 16K
Cat No. 1332 \$4.95

SARGON II

Hayden
The latest, updated version of
Sargon. Features seven levels of
play, and many exciting new addi-
tions.

Cat No.	Description	Price
2082	TRS-80, L2, 16K cass	\$29.95
2083	Apple II, 16K cass	\$29.95
	TRS-80, disk	\$39.95
	Apple II, disk	\$39.95

SOUNDWARE

Add music and sound effects to
your programs. Complete with
software and hardware. Installs in
seconds.
Cat No. 1898 TRS-80, L2 \$29.95

CRIBBAGE

Plays according to Hoyle's Rules.
You vs the computer.
Cat No. 1179 TRS-80, L2, 16K \$9.95

SYSCOP

Duplicates SYSTEM tapes (for
backup).
TRS-80 L2, 4K.
Cat No. 1681 \$9.95

ADVENTURE

Explore an almost endless maze
of treasures and pitfalls. Chal-
lenging and fun!
TRS-80 L2, 16K.
Cat No. 1723 \$14.95

Verbatim 5 1/4" DISKETTES

The most popular diskette in
the world!

\$29/box of 10
2 for \$55

Cat No.	Type	Description
1147	525-01	Soft, TRS-80
1148	525-10	10 hole hard, Apple, North- star, HB
1149	525-16	16 hole hard, Micropolis

TRS-80 DUST COVERS

Keeps dust from sensitive com-
ponents. Custom designed for the
TRS-80.

Cat No.	Description	Price
1553	Keyboard	\$8.50
1554	Video	9.95
1552	Cassette	7.00
1551	Disk	7.00

Buy any 3, take 10% off!

DISK/DISKETTE LIBRARY CASES

Perfect for storage and mailing! Hi-
impact plastic case, holds up to 10
disks.

Cat No. 1484	5 1/4" diskettes	8 oz.	\$2.60
Cat No. 1936	8" disk	10 oz.	\$3.65

VERBATIM CERTIFIED CASSETTES

2 for
\$4.95

Certified specifically for personal
computers such as the TRS-80,
Apple, Pet, etc. Splice-free,
leaderless, with folding recording
tabs.
Cat No. 1945

COLOR CODED RIBBON CABLE

Flat style, rainbow colored.
Separates like zip-cord. 28 gage, 20
conductors per inch wide.

Order by Cat No. 2147 and
conductors

Cond	3 ft.	10 ft.	25 ft.
14	\$2.10	\$ 5.60	\$10.50
16	\$2.40	\$ 6.40	\$12.00
20	\$3.00	\$ 8.00	\$15.00
26	\$3.90	\$10.40	\$19.50
34	\$5.10	\$13.60	\$25.50
40	\$6.00	\$16.00	\$30.00
50	\$7.50	\$20.00	\$37.50

HOW TO ORDER

Pay by check, Mastercharge,
Visa, or COD. Charge orders
please include expiration date.
Foreign pay in U.S. funds. Order
by phone or mail, or at our retail.
MINIMUM ORDER \$10. please
include phone number and mag-
azine/issue you are ordering from.
Prices valid thru last day of
cover date. SHIPPING: USA:
add \$2.00 for the first 2 lbs. For

ground add 35¢ for add'l lb. For
air add 75¢ for add'l lb. FOR-
EIGN: surface: add \$3.00 for first
2 lbs, 60¢ per add'l lb. Air: add
\$11.00 for first 2 lbs, \$5 for each
add'l lb. CODs \$1 add'l. Guar-
anteed satisfaction for 120 days
or your money back! Not re-
sponsible for typographical
errors. Some items subject to
prior sale. We reserve the right
to limit quantities.

SEND FOR FREE CATALOG FEATURING:

Computers and accessories, disk
drives, printers, integrated cir-
cuits, LEDs, semiconductors,
books, software, connectors,
plus more and more! The widest
selection at the lowest prices!
Circle our reader service number
or phone/write today for your
copy!

5 1/4" DRIVE ENCLOSURES

- Fits Shugart, MPI, Pertec, and more!

Single enclosure is two-piece metal
construction, beige-tone. Dual
Enclosure is one-piece molded
plastic, charcoal grey finish.

Cat No. 2055 Dual 1 1/2 lbs \$59
Cat No. 2245 Single 2 lbs \$25
as low as \$25

CRYSTALS

Order by Cat No. 1150 and value

Your
Choice
\$3.50

3.2768	4.9152	8.0000	20.0000
3.3300	4.9562	10.0000	22.1184
3.579545	5.0000	11.43000	23.4000
3.59532	5.0688	12.0000	23.6840
3.6864	5.1850	12.4400	25.0000
4.0000	5.5850	13.5168	27.0000
4.194304	5.5870	14.31818	32.0000
4.0240	5.7143	15.0000	32.0000
4.4340	5.9904	18.0000	36.0000
4.4400	6.0000	18.4320	100.0000
4.5500	6.1440	19.3540	
4.7500	6.5536	19.6608	

Your Choice
\$4.00

1.0000	2.097152
1.0250	2.4576
1.8432	2.5000
2.0000	3.0000
2.0120	

MATCHLESS SYSTEMS

TRS-80 MINIDISK DRIVE

The best drive available today!
Complete and ready to use, with
free 2-drive cable! Free software
for speeding up your access time
from 35ms to 12ms! Optional
software for increasing data
storage from 55K to 67.8K on
your first drive, and to 89K on
your second drive! Full 120 day
money back guarantee!



Cat No.	Description	Price
1375	Drive w/2 drive cable	\$395.
1396	4 drive cable (alone)	49.
1938	Tracks 36-40 software	10.
1147	Verbatim diskettes, 10 for	\$33

LEEDEX VIDEO 100 12" MONITOR

- Compatible with TRS-80, Apple, and most small computers!
- High resolution!

Low cost, yet high resolution (650
line). Compares favorably with
monitors costing twice as much.
Because of the fact that standard
composite video input is utilized no

RF modulator is needed an ex-
tremely sharp and stable picture is
achieved. The video bandwidth is
12MHz + 1.5db with a 75ohm input
impedance.

Cat No. 1204	Leedex Monitor, 139
	18 lbs.
Cat No. 1937	TRS-80/Leedex Cable
	kit, 6 oz \$3

\$139

Novation "Cat" Acoustic Modem

The first quality compact modem
designed specifically for the small
computer user. Designed to
transmit data over standard
telephone lines, the Cat has many
uses for business and hobbyist.
Allows one terminal or computer to
interact with others, permitting one
access to data from remote loca-
tions. Hobbyists can exchange data
and programs. Compatible with any
Bell 103 modem and, of course, all

other Cats! Also perfectly compati-
ble with the new Radio Shack
modem (it's the same unit). Data ex-
change can occur at any speed up
to 30 char/sec. Low profile case
features switches for mode selec-
tion and operation, also for LED's
displaying unit status. Acoustic self-
test is standard. Complete and
ready-to-use. Requires 110 VAC,
60Hz.
Cat No. 1480 **\$169**

9 VOLT 3 AMP POWER TRANSFORMER

9V @ 3A, also 15V @ 500mA
isolated. Regulates easily to 5VDC,
12VDC. Heavy shielded construc-
tion. Wt 2 lbs.
Cat No. 1339 **\$4**

TV MODULATOR (kit)

Assembles in minutes,
installs in minutes!

Accepts composite video output
from computers, TV games, etc. Re-
quires 6VDC, operates on any stan-
dard B&W TV, channel 2 or 3. Com-
pletely shielded. Not to be used
where prohibited by law. Wt 4 oz.
Cat No. 1975 **\$4 3 for \$10**

19511 Business Center Dr. Dept. V4 Northridge, Ca. 91324

have answered these, four more will be provided until you have worked a total of 20. A score is given, and then you have an opportunity to try some more. My only complaint is that answers to problems have to be entered from right to left. For instance, in $8 + 4 = 12$, the 2 must be entered first, although the natural tendency would be to write 12.

Flashcard brings back my grammar school days. Math problems were printed on cards and flashed before the class. The student who got the most correct answers won a prize. The computer version lets you make up as many cards as you like (up to 400 in a 16K machine) and then flashes them on the screen. They can also be saved on cassette for later use.

Metric asks questions about the correspondence between English and metric units—Is 11 centimeters longer than 4 inches?—and then shows the conversion formula if you answer incorrectly.

Numbers is for preschoolers. It asks "What number comes after X?" Even children who can't read yet can learn to recognize numbers and their relationship. Correct answers result in a graphic display.

Tachist is intended to improve your reading skill by flashing phrases on the screen. Every time that you get a phrase correct, the next phrase is flashed at a quicker speed. I would like to see more practice at each level before the speed is increased.

Vocab is a multiple-choice vocabulary test. A word and five possible definitions are presented, and your answers are graded. The words and definitions are contained in a short data list. You can, of course, add to the list or have someone do it for you. Or you can set up lists that correspond to the vocabulary levels of your children.

This package will appeal to those who have youngsters at home. It is a good way to help them with their schoolwork and to get them interested in using the computer for something besides games.

Tape # 3

Games—has some old games and some new ones.

Decode is Mastermind with a new face. Still interesting.

Groan is a dice game that is new to me. Two dice are rolled by the computer and the player in turn, and each scores the number of points on the dice... unless one of the dice comes up with a face on it (groan!), in which case you don't get any points.

You can roll the dice as many times as you like, but you lose all of your points if the face comes up after the first roll in each round. The graphics in Groan are very good, but, as usual, the computer is a poor loser.

rugged course. Every time that you run off the road, you are done for the day. Your daily and total mileage is then displayed. You can start off again the next day. This has good graphics and will keep your steering fingers busy.

Wari is a new game for me. You start out with four stones in each of twelve squares. Stones are moved around the board in an attempt to capture the computer's pieces while it is trying to capture yours. I am not a game player, but I really enjoy this one and think that it is the best in this very good package.

Tape # 4

Mathematics—is a specialized tape as we shall see.

The first noteworthy feature of these tapes is their ease of loading.

Jot is a word-guessing game. You and the computer each think of a word, and then each of you try to guess the other's word. Sort of like Mastermind. The computer runs very slowly at first, but the action picks up as the game moves along. Words are limited to those in the data list, but it can be expanded.

Obstacle is a two-player game in which the computer is the referee. Each player is assigned a block inside of a fenced-in area. The block must be moved so as to avoid hitting the fence or the other player. To complicate matters, as each block is moved, it leaves a trail of blocks behind it, and movement is so rapid that you really have to be fast to keep up with the action. This is a challenger!

Roadrace is another fast-paced game. You are driving in a roadrace that can stretch over a period of days. You try to steer your car around the curves and along the straightaways of this

Curve fits a power polynomial function to a set of data pairs.

Diffeqn figures differential equations.

Graph plots the behavior of a math function.

Integrate finds the numerical integral of a function.

Simeqn solves a set of simultaneous linear equations.

Stats analyzes a set of numerical data and displays several statistical parameters that describe it.

If you understand any of the above, then maybe this package is for you.

Tape # 5

Graphics Display & Miscellaneous Programs—is more for demonstration than practical application. The graphics and mathematical abilities of the TRS-80 are showcased.

Kaleido, Sparkle and Squares are three programs that display continually changing graphics pictures on the screen. I'm a

sucker for this kind of display. Soft music, wine and computer graphics!

Walloons is a different type of graphics display from the above. After a tricky introduction, the Walloons go into their circus act. It is a very good example of what is possible with the TRS-80. This program loaded each time with two combined lines, which caused an error message. After separating the two lines, I dumped it back to the tape for trouble-free loading from then on.

Birthday figures the odds of two or more people in a group having the same birthday. Groups from 1 to 60 are investigated. Try this out at your next party.

Pi calculates the value of pi (3.14159265) by randomly throwing darts at a circle imposed on a square. This apparently has some basis in mathematics. Sounds like the old "dropping the needle on a flag" routine.

Powers figures the successive powers of any integer and then displays the result, which can contain up to 250 digits. It does take a while though!

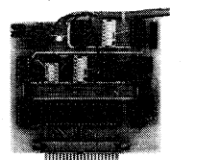
Pythag generates the Pythagorean triplets which satisfy the formula—the sum of the squares of the two sides of a triangle are equal to the square of the hypotenuse.

The techniques demonstrated in these programs will be helpful when someone asks you, "But what can your computer do?" They will also help the budding BASIC programmer to better understand the capabilities of Level II BASIC.

The documentation with any of these tapes is quite slender, but they are all self-prompting, and you shouldn't have any problems figuring out how to run them. Most of them are also described in a book from Dilithium Press called *32 BASIC Programs for the TRS-80 Computer (Level II)* by Rugg and Feldman. I haven't seen this book, but the literature with each tape indicates that it contains full instructions and information on how the programs work and how they can be modified. ■

TRS-80 SERIAL I/O

- Can input into basic
- Can use LIST and LPRINT to output, or output continuously
- RS-232 compatible
- Can be used with or without the expansion bus
- On board switch selectable baud rates of 110, 150, 300, 600, 1200, 2400, parity or no parity odd or even, 5 to 8 data bits, and 1 or 2 stop bits. D.T.R. line
- Requires +5, -12 VDC
- Board only \$19.95 Part No. 8010, with parts \$59.95 Part No. 8010A, assembled \$79.95 Part No. 8010C. No connectors provided, see below.



EIA/RS-232 connector Part No. DB25P \$6.00, with 9', 8 conductor cable \$10.95 Part No. DB25P9

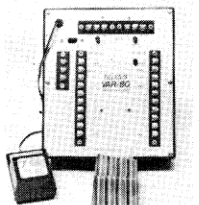
3' ribbon cable with attached connectors to fit TRS-80 and our serial board \$19.95 Part No. 3CAB40

COMPUCRUISE



\$129.95, with cruise control \$169.95

THE TELESIS VAR-80 INTERFACE UNIT



For the TRS-80 with Level II Basic • Provides 8 outputs • Provides 8 inputs • 2 ft. of interconnecting cable w/ connector • Plugs directly into TRS-80 • Power supply provided • Assembled and tested. Part No. VAR80, Introductory price \$109.95.

GAME PADDLES & SOUND



Includes: 2 game paddles, interface, software, speaker, power supply, full documentation including: schematics, theory of operation, and user guide; plus 2 games on cassette (Pong and Starship War). \$79.95 Complete Part No. 7922C

DIGICOM DATA PRODUCTS INC. Series 312 Acoustic Coupler



300 BAUD Originate, Part No. AC3122, \$219.95. 300 BAUD Answer, Part No. AC3122, \$219.95. 300 BAUD Answer/Originate, Part No. AC3123, \$229.95.

LIGHT-PEN For Your TRS-80



Your TRS-80 Light-Pen is a carefully engineered instrument and with the proper care will give satisfactory use and many years of service. Part No. TRS80LP \$24.95.

SYSTEM EXPANSION from LNW Research

- Serial RS232C/20 mA I/O
- Floppy controller
- 32K bytes memory
- Parallel printer port
- Dual cassette port
- Real-time clock
- Screen printer bus
- Onboard power supply
- Software compatible
- Solder mask, silk screen. PC board and user manual. Part No. LNW80, \$69.95.

DISKETTES

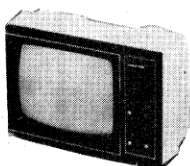


Box of 10, 5" \$29.95, 8" \$39.95. Plastic box, holds 10 diskettes, 5" - \$4.50, 8" - \$6.50.

16K RAMS

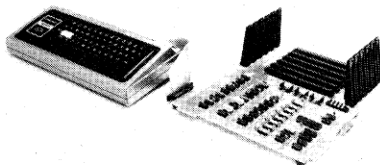
For the Apple, TRS-80 or Pet \$8 each Part No. 4116/2117.

LEEDEX MONITOR



12" Black and White • 12 MHz Bandwidth • Handsome Plastic Case • \$139.00

S-100 INTERFACE



AN S-100 bus Adapter—Motherboard for the TRS-80. Kit, Part No. HUH81DLXK, \$295.95. Assembled, Part No. HUH81DLXA, \$375.95.

NOW! A FULL SUPPORT SYSTEM FOR TRS-80



- 32K of RAM
- EPROM firmware
- Disk control
- Data acquisition
- Parallel I/O
- Serial I/O
- Plug into GPA's Motherboard. GPA's quality design includes • 6-44 pin edge connectors • +5V, -5V, +12V, -12V external power supply required
- Active termination. The Motherboard, Part No. GPA80, is only \$149.95.

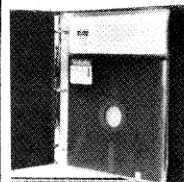
TAKE ADVANTAGE OF GPA-EXPANSION CARDS FOR THE GPA80

Memory cards: Now with Fortran compilers available for your TRS-80, additional expansion memory is a must! Card with sockets only, Part No. GPA801, \$119.95. Card with 16K of 4116 Dynamic Ram, Part No. GPA802, \$224.95. Card with 32K of 4116 Dynamic Ram, Part No. GPA803, \$329.95. All cards come equipped with sockets to accommodate 32K of Ram.

EPROM firmware card. Put those valuable subroutines in firmware. Don't waste time loading and unloading tapes and disks. For 2708 or 2716 EPROMS, Part No. GPA806, \$79.95. **Serial I/O card.** Here's what you've been asking for, a full serial terminal interface, with RS-232C or 20 mA. Current loop. Input/output capabilities. Part No. GPA807, \$79.95.

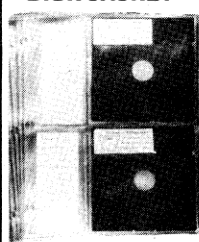
Parallel I/O Card. Control functions in the outside world, monitor and store real time events. Two parallel output ports. Dip switches select ports (0-254). Part No. GPA808, \$79.95.

FLOPPY DISK STORAGE BINDER



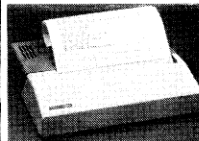
Three-ring binder comes with ten transparent plastic sleeves which accommodate either twenty, five-inch or ten, eight-inch floppy disks. Binder & 10 holders \$14.95 Part No. 8800; Extra holders 95¢ each. Part No. 800.

DISK JACKET™



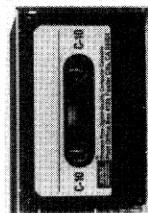
Holds two 5-1/4 inch diskettes and will fit any standard three ring binder. \$9.95/10 Pack.

TRENDCOM PRINTER



- 40 characters per second
- 4-7/16 inch wide thermal paper
- Graphics (TRENDCOM 100): 480 sevendot print positions per line. TRENDCOM 100, Part No. TRC0100, \$495.95. TRENDCOM 200, Part No. TRC0200, \$375.95. **Interface for TRS-80,** Part No. T80A \$45.95. For Apple II, Part No. TRCAII, \$75.95. For PET, NO. TRCP2, \$79.95. For Scoccher, TRCSR1 \$45.95.

DIGITAL CASSETTE



5 min. each side. Box of 10 \$9.95. Part No. C-5.

SARGON: A Computer Chess Program

Features the complete program that won the 1978 West Coast Computer Faire Tournament. Part No. 00603 — TRS-80 Level II; Part No. 00604 — Apple II (24K). \$19.95

SOUND EFFECTS AND MUSIC FOR YOUR COMPUTER



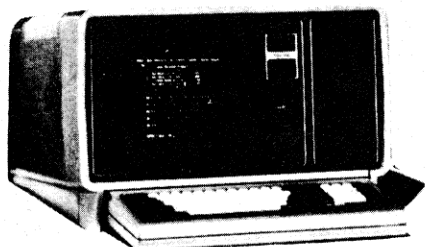
SOUNDWARE is a complete system. It includes a speaker/amplifier unit with volume control, earphone jack, and connectors. It boasts excellent tone quality yet is small and convenient to use. Add batteries, plug it in, and play. One year warranty. **SOUNDWARE** package (includes INTRO to SOUNDWARE programs) PET (8K), Part No. 20003, \$29.95. TRS-80 Level II (16K), Part No. 20002, \$29.95. Compucolor II (8K), Part No. 20001, \$39.95. **INTRO to SOUNDWARE** programs only PET and TRS-80, Part No. 20005, \$14.95. Compucolor II Part No. 20006, \$19.95.

To Order: Mention part no. description, and price. In USA shipping paid by us for orders accompanied by check or money order. We accept C.O.D. orders in the U.S. only, or a VISA or Master Charge no., expiration date, signature, phone no., shipping charges will be added. CA residents add 6.5% for tax. Outside USA add 10% for air mail postage and handling. Payment must be in U.S. dollars. Dealer inquiries invited. 24 hour order line (408) 448-0800



Send for FREE Catalog... a big self-addressed envelope with 41¢ postage gets it fastest!

ELECTRONIC SYSTEMS Dept. 80 P. O. Box 21638, San Jose, CA USA 95151



from MiniMicroMart...

Radio Shack® TRS-80's

(prices do not include shipping)

MiniMicroMart Order No.	Mfg. Order No.	Description	List Price	Discount Price	CASH PRICE
TRS-80 Complete Systems					
TAN-14001-0	26-4001	TRS-80 Mod. II, 32K	\$3450	\$3161	\$3099
TAN-14002-0	26-4002	TRS-80 Mod. II, 64K	3899	3567	3499
TAN-00000-0	26-4160	1-Drive Expansion System	1150	1056	1035
TAN-00000-0	26-4161	2-Drive Expansion System	1750	1607	1575
TAN-00000-0	26-4162	3-Drive Expansion System	2350	2157	2115
TAN-00000-0	26-4163	Disk Drive Kit (Drive Only)	600	551	540
Systems below include CPU/Keyboard, Power Supply, Video Monitor, Cassette Recorder, Manual, and Game Cassette					
TAN-11051-0	26-1051	4K RAM, Level-I BASIC	\$ 499	\$ 458	\$ 449
TAN-11053-0	26-1053	16K RAM, Level-I BASIC w/numeric keypad	729	669	656
TAN-11054-0	26-1054	4K RAM, Level-II BASIC	619	568	557
TAN-11056-0	26-1056	16K RAM, Level-II BASIC w/numeric keypad	849	779	764
TRS-80 Expansion Kits for CPU's (Installation Included)					
TAN-31101-0	26-1101	16K RAM Memory Plus Numeric Keypad*	230	211	207
TAN-31103-0	26-1103	Numeric Keypad	79	72	71
TAN-31120-0	26-1120	Level-II BASIC (Installation Included)*	120	110	108
TRS-80 Expansion Interface					
TAN-31140-0	26-1140	Expansion Interface with 0 RAM	299	274	269
TAN-32141-0	26-1141	Expansion Interface with 16K RAM	448	411	403
TAN-32142-0	26-1142	Expansion Interface with 32K RAM	597	542	537
TAN-32102-0	26-1102	16K RAM Memory (Installation Included)	149	137	134
TRS-80 Mini Disk System					
TAN-41160-0	26-1160	First Disk Drive (Includes DOS, Cable)	499	458	449
TAN-41161-0	26-1161	Disk Drives 2, 3 and 4 (Each)	499	458	449
TRS-80 Printers and Cables					
TAN-22150-0	26-1150	Line Printer I, Friction Feed (same as 779)	1,299	1,192	1,169
TAN-22152-0	26-1152	Line Printer I, Tractor Feed	1,559	1,431	1,403
TAN-00000-0	26-1154	Line Printer II (same as 730)	970	890	873
TAN-00000-0	26-1402	Roll Paper	20	20	20
TAN-00000-0	26-1156	Line Printer III	1,960	1,799	1,764
TAN-00000-0	26-1417	14 7/8 x 11" Fanfold Paper	50	46	45
TAN-00000-0	26-1404	Mail Labels	20	19	18
TAN-22153-0	26-1153	Quick Printer	499	458	449
TAN-22401-0	26-1401	Printer Connection Cable, Mod. I w/expansion interface for Line Printer I (779) [†] , or III	39	39	39
TAN-29141-5	26-1415	Printer Connection Cable, Mod. I w/expansion interface for Line Printer II (730) ^{††}	39	39	39
TAN-29141-1	26-1411	Printer Interface Cable for Mod I w/o expansion interface for use with Line Printer I [†] or III	59	54	53
TAN-29141-6	26-1416	Line Printer Interface Cable for Mod. I w/o expansion interface for use with Line Printer II ^{††}	59	54	53
TAN-29440-1	26-4401	Printer Cable for Mod. II to Line Printer I (779) [†] or III	39	39	39
TAN-29440-2	26-4402	Printer Cable for Mod. II to Line Printer II (730) ^{††}	29	29	29
TRS-80 Interface Devices					
TAN-61145-0	26-1145	RS-232-C Board	99	91	89
TAN-61171-0	26-1171	Telephone Interface II (Originate/Answer)	199	183	179
TAN-61180-0	26-1180	Voice Synthesizer	399	366	359
TRS-80 Software					
TAN-50310-0	26-0310	TRSDOS Disk BASIC	14.95	14.95	14.95
TAN-92104-D	26-2104	TRSDOS/Disk BASIC Manual	5.95	5.95	5.95

SHIPPING & INSURANCE: TRS-80 MOD II's, Line Printer I, III's are shipped freight collect. Add \$10 shipping for TRS-80 MOD I's. Add \$5 for expansion interfaces and disk drives, \$3 for other.

[†] Line Printer I identical to Centronics 779, Cable also works with all Centronics 700 series, incl. 701, 702, 703. Also works with NEC 5530, TI-810 w/303 option, and Anadex DP8000. ^{††} Line Printer II identical to Centronics 730. *Prices based on exchange of existing ROM/RAM chips.

The Radio Shack items on the above price list are shipped directly from an authorized Radio Shack store. The items are brand-new, come in factory cartons, with receipt, and you are entitled to warranty service from any Radio Shack store.

Add-on memory on above price list is Radio Shack price for installation at a Radio Shack store. We can supply 16K add-on memory for your TRS-80 keyboard or expansion interface for \$89 per 16K. ... you install it yourself with simple instructions supplied.

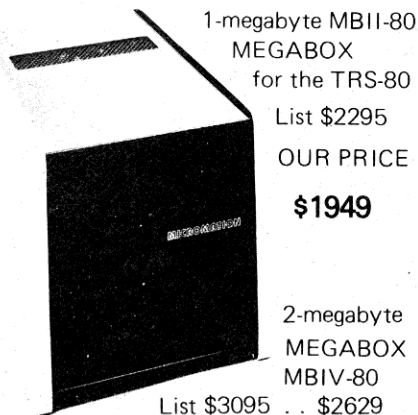
TAN-1-2/80

... We have them ALL

All the Disks and Printers that interface to the TRS-80®

5¼" Drives — 8" Drives — Single and Double Density — and Hard Disk Systems with up to 40 megabytes!

MICROMATION MEGABOX



1-megabyte MBII-80 MEGABOX for the TRS-80
List \$2295
OUR PRICE

\$1949

2-megabyte MEGABOX MBIV-80
List \$3095 .. \$2629

CP/M Operating System for above ... \$150
Microsoft Patch to ROM BASIC ... \$150

DISK DRIVES

Fully compatible with expansion interface and TRSDOS software, VISTA, PERCOM, LOBO, and others —

**SAVE OVER \$100 — YOUR CHOICE
ONLY \$359 each**

**CORVUS 10 megabyte hard disk for Mod. I or II
ONLY \$4795**

CONVERT YOUR EXISTING SELECTRIC TYPEWRITER TO A PRINTER...

Power Supply & electronics, assembled & tested. You make only a simple solenoid installation (or have the factory do it). Manufactured by Escon.

Parallel version, List \$575 **ONLY \$514**
TRS-80 cable \$ 27

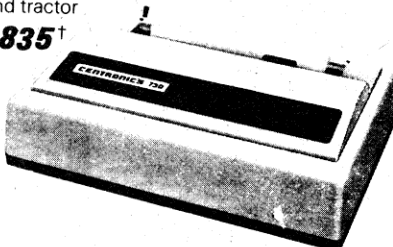
CP/M® OPERATING SYSTEM

for Mod. I \$129
for Mod. II \$149
Complete line of CP/M Software available at discount prices.

CENTRONICS PRINTERS

NEW 730

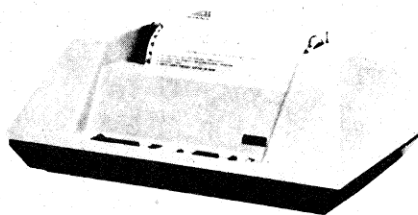
w/friction and tractor
\$835†



779-1 (TRS-80 Line Prtr. 1), List \$1245 949*
779-2 with tractor, List \$1350 1049*
702-2 120 cps, bi-directional, tractor, VFU 1995
703-2 185 cps, bi-directional, tractor, VFU 2395
(shipped freight collect)

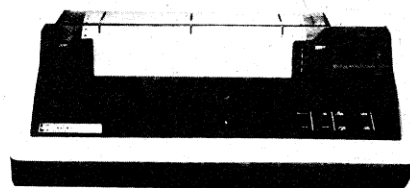
ANADEX

80-COL. DOT MATRIX PRINTER



Complete upper and lower case ASCII char. set, bi-directional at 84 lines/min. Features RS232 20/60 mil current loop and Centronics parallel interface. Ideal for use with TRS-80, Sorcerer, Cromemco, and NorthStar systems.

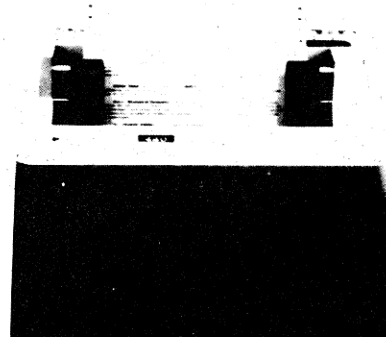
OUR PRICE ONLY \$895
(shipping \$10)



Bi-directional; 150 cps; logic seeking; adjustable tractor. Available with lower case compressed print; forms length control or vertical forms control option. Centronics style parallel interface also available.

T.I. 810 with serial/parallel interface
List 1940 **OUR PRICE \$1735**
T.I. 810 printer outperforms Line Printer III.

PAPER TIGER®



Paper Tiger, List \$995 **ONLY \$895**
w/graphics options, incl. buffer, \$1194 ... \$989
IP-225 w/1210, 1250 options, List \$984 834
IP-225 w/tractor, 1210*, 2K buffer, & graphics options, List \$1098 899
TRS-80 cable 45
*1210 option is expanded/compressed print.

NEC SPINWRITER™



*The Fantastic Letter-Quality
Printer at 55 cps*

5530 RO/Centronics Interf., \$3275 **\$2475**
(shipped freight collect)

Printers for TRS-80 require Level II machines. Printer cables extra. Call for price and order number.

* Same as Line Printer I
† Same as Line Printer II

SHIPPING AND INSURANCE: Add \$5 for Selectric Converter, \$6 for disk drives, \$10 for Megabox. Centronics printers shipped freight collect. Contact us for shipping information on other printers.
All prices subject to change and all offers subject to withdrawal without notice. Prices in this ad are for prepaid orders. Slightly higher prices prevail for other-than-prepaid orders, i.e., C.O.D., credit card, etc.

— WRITE FOR FREE CATALOG —

MiniMicroMart, Inc.

1618 James Street, Syracuse, NY 13203

(315) 422-4467

TWX 710-541-0431



NEW ADDITIONS

● **PROGRAMMING THE Z-80** — BK1122 — by Rodnay Zaks. Here is assembly language programming for the Z-80 presented as a progressive, step-by-step course. This book is both an educational text and a self-contained reference book, useful to both the beginning and the experienced programmer who wish to learn about the Z-80. Exercises to test the reader are included. \$14.95.*

● **Z-80 SOFTWARE GOURMET GUIDE AND COOKBOOK** — BK1045 — by Nat Wadsworth. Scelbi's newest cookbook! This book contains a complete description of the powerful Z-80 instruction set and a wide variety of programming information. Use the author's ingredients including routines, subroutines and short programs, choose a time-tested recipe and start cooking! \$14.95.*

● **LEARNING LEVEL II** — BK1175 — by David Lien. Written especially for the TRS-80, this book concentrates on Level II BASIC, exploring every important BASIC language capability. Updates are included for those who have studied the Level I User's Manual. Sections include: how to use the Editor, dual cassette operation, printers and peripheral devices, and the conversion of Level I programs to Level II. \$15.95.*

● **TRS-80 DISK AND OTHER MYSTERIES** — BK1181 — by Harvard C. Pennington. This is the definitive work on the TRS-80 disk system. It is full of detailed "How to" information with examples, samples and in-depth explanations suitable for beginners and professionals alike. The recovery of one lost file is worth the price alone. \$22.50.*

● **BASIC BASIC (2ND EDITION)** — BK1026 — by James S. Coan. This is a textbook which incorporates the learning of computer programming using the BASIC language with the teaching of mathematics. Over 100 sample programs illustrate the techniques of the BASIC language and every section is followed by practical problems. This second edition covers character string handling and the use of data files. \$9.45.*

● **Z-80 ASSEMBLY LANGUAGE PROGRAMMING** — BK1177 — by Lance A. Leventhal. This book thoroughly covers the Z-80 instruction set, abounding in simple programming examples which illustrate software development concepts and actual assembly language usage. Features include Z-80 I/O devices and interfacing methods, assembler conventions, and comparisons with 8080A/8085 instruction sets and interrupt structure. \$12.50.*

● **INTRODUCTION TO TRS-80 GRAPHICS** — BK1180 — by Don Inman. Dissatisfied with your Level I or Level II manual's coverage of graphics capabilities? This well-structured book (suitable for classroom use) is ideal for those who want to use all the graphics capabilities built into the TRS-80. A tutorial method is used with many demonstrations. It is based on the Level I, but all material is suitable for Level II use. \$8.95.*

● **THE INCREDIBLE SECRET MONEY MACHINE** — BK1178 — by Don Lancaster. A different kind of "cookbook" from Don Lancaster. Want to slash taxes? Get free vacations? Win at investments? Make money from something that you like to do? You'll find this book essential to give you the key insider details of what is really involved in starting up your own money machine. \$5.95.*

● **FREELANCE SOFTWARE PUBLISHING** — BK1179 — by B. J. Korites. "This book is about money and how to make it by writing and selling computer programs," (author's foreword). If you have the skills to write a saleable program, you now need to acquire the skills to sell that program. This compact book comprehensively covers the entire publishing process and many aspects of software salesmanship. \$14.95.*



Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Peterborough NH 03458. Be sure to include check or detailed credit card information. All orders add \$1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

● **THE BASIC HANDBOOK** — BK1174 — by David Lien. This book is unique. It is a virtual ENCYCLOPEDIA of BASIC. While not favoring one computer over another, it explains over 250 BASIC words, how to use them and alternate strategies. If a computer does not possess the capabilities of a needed or specified word, there are often ways to accomplish the same function by using another word or combination of words. That's where the HANDBOOK comes in. It helps you get the most from your computer, be it a "bottom-of-the-line" micro or an oversized monster. \$14.95.*

● **ADVANCED BASIC** — BK1000 — Applications and problems by James Coan is for those who want to extend their expertise with BASIC. Offers advanced techniques and applications. \$9.65.*

● **PIMS: PERSONAL INFORMATION MANAGEMENT SYSTEM** — BK1009 — Learn how to unleash the power of a personal computer for your own benefit in this ready-to-use data-base management program. \$9.95.*

● **PAYROLL WITH COST ACCOUNTING — IN BASIC** — BK1001 — by L. Poole & M. Borchers, includes program listings with remarks, descriptions, discussions of the principle behind each program, file layouts, and a complete user's manual with step-by-step instructions, flowcharts, and simple reports and CRT displays. Payroll and cost accounting features include separate payrolls for up to 10 companies, time-tested interactive data entry, easy correction of data entry errors, job costing (labor of distribution), check printing with full deduction and pay detail, and 16 different printed reports, including W-2 and 941. \$20.00.*

● **LOW-COST, PERSONAL COMPUTER-BASED INVESTMENT DECISION SYSTEMS** — BK1101 — Use this guidebook by Man-Computer Systems, Inc.'s president, Jerry Felsen, to develop inexpensive personal computer systems that can help you make better investment decisions. \$15.00.*

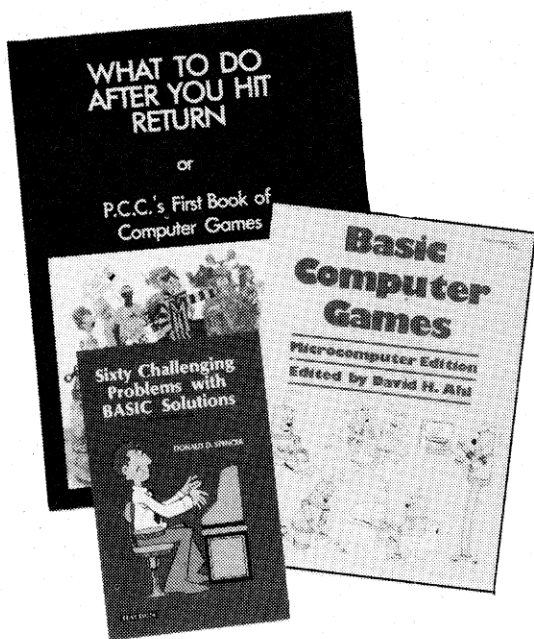
● **HOW TO MAKE MONEY WITH COMPUTERS** — BK1003 — In 10 information-packed chapters, Jerry Felsen describes more than 30 computer-related, money-making, high profit, low capital investment opportunities. \$15.00.*

● **SOME COMMON BASIC PROGRAMS** — BK1053 — published by Adam Osborne & Associates, Inc. Perfect for non-technical computerists requiring ready-to-use programs. Business programs, plus miscellaneous programs. Invaluable for the user who is not an experienced programmer. All will operate in the stand-alone mode. \$12.50 paperback.*

● **WHAT TO DO AFTER YOU HIT RETURN** — BK1071 — PCC's first book of computer games ... 48 different computer games you can play in BASIC ... programs, descriptions, many illustrations. Lunar Landing, Hammurabi, King, Civel 2, Qubic 5, Taxman, Star Trek, Crash, Market, etc. \$10.95.*

● **BASIC COMPUTER GAMES** — BK1074 — Okay, so once you get your computer and are running in BASIC, then what? Then you need some programs in BASIC, that's what. This book has 101 games for you from very simple to real buggers. You get the games, a description of the games, the listing to put in your computer and a sample run to show you how they work. Fun. Any one game will be worth more than the price of the book for the fun you and your family will have with it. \$7.50.*

● **SIXTY CHALLENGING PROBLEMS WITH BASIC SOLUTIONS (2nd Edition)** — BK1073 — by Donald Spencer, provides the serious student of BASIC programming with interesting problems and solutions. No knowledge of math above algebra required. Includes a number of game programs, as well as programs for financial interest, conversions and numeric manipulations. \$6.95.*



Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Peterborough NH 03458. Be sure to include check or detailed credit card information. All orders add \$1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

FOR TOLL FREE ORDERING CALL 1-800-258-5473

80 microcomputing^{T.M.}

bookshelf



• **THE NEW HOBBY COMPUTERS—BK7340**—This book takes it from where "HOBBY COMPUTERS ARE HERE!" leaves off, with chapters on Large Scale Integration, how to choose a microprocessor chip, an introduction to programming, low cost I/O for a computer, computer arithmetic, checking memory boards . . . and much, much more! Don't miss this tremendous value! Only \$4.95.*

• **HOBBY COMPUTERS ARE HERE!—BK7322**—If you (or a friend) want to come up to speed on how computers work . . . hardware and software . . . this is an excellent book. It starts with the fundamentals and explains the circuits, and the basics of programming. This book has the highest recommendations as a teaching aid for newcomers. \$4.95.*

• **HOW TO BUILD A MICROCOMPUTER—AND REALLY UNDERSTAND IT—BK7325**—by Sam Creason. The electronics hobbyist who wants to build his own microcomputer system now has a practical "How-To" guidebook. This book is a combination technical manual and programming guide that takes the hobbyist step-by-step through the design, construction, testing and debugging of a complete microcomputer system. Must reading for anyone desiring a true understanding of small computer systems. \$9.95.*

• **TOOLS & TECHNIQUES FOR ELECTRONICS—BK7348**—is an easy-to-understand book written for the beginning kit builder as well as the experienced hobbyist. It has numerous pictures and descriptions of the safe and correct ways to use basic and specialized tools for electronic projects as well as specialized metal working tools and the chemical aids which are used in repair shops. \$4.95.*

Use the order card in the back of this magazine or itemize your order on a separate piece of paper and mail to 80 Microcomputing Bookshelf • Peterborough NH 03458. Be sure to include check or detailed credit card information. All orders add \$1.00 handling. Please allow 4-6 weeks for delivery. Questions regarding your order? Please write to Customer Service at the above address.

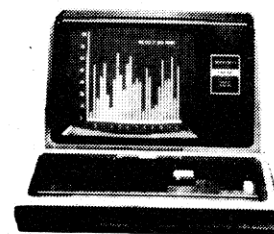
FOR TOLL FREE ORDERING CALL 1-800-258-5473



AUTHORIZED

Radio Shack[®] DEALER A301

COMPUTER SPECIALISTS



**10%
DISCOUNT
Off
List**

64K 1 Drive
\$3499.00

Popular 16K Level II System	\$ 722.00
26-1145 RS-232 Board	84.00
26-1140 "O" K Interface	254.00
26-1160 Mini Disk	424.00
26-1171 Telephone Modem	169.00
Fast 100 CPS Centronics 730 Printer	750.00
Highly Reliable Lobo 5 1/4" Drives	375.00
Versatile Lobo Interface, 8" Drives and IMI Hard Drives	Call For Prices

**15%
DISCOUNT
Off
List**

4K Level II
\$527.00

No Taxes on Out Of
State Shipments

Immediate Shipment
From Stock.

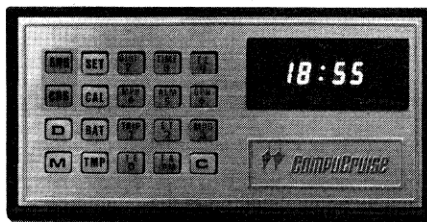
MICRO MANAGEMENT SYSTEMS, INC.
DOWNTOWN PLAZA SHOPPING CENTER

115 C SECOND AVE. S.W. ✓72
CAIRO, GEORGIA 31728
912-377-7120

Full Factory Warranty
on All Items Sold.

VISA, Master Charge
and COD's, Add 3 %

If you enjoy driving, you're going to get a **COMPUCRUISE**. Once you see what it can do, you just won't be able to live without it.



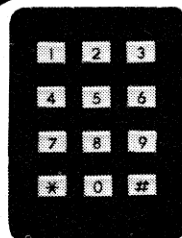
This gadget fits into most dashboards... no strain even in a tiny sports car like the Mazda RX-7... and once you have it, every trip is like flying a 747. The darned thing tells you the time, how fast you're going, how far you've been on this trip or since the last regassing, how many miles per gallon you're getting, either at the instant or the average on the trip... or gallons per hour at the moment or for the trip... temperature outside... inside (or coolant temperature, if you prefer)... oh, it has an elapsed time for the trip, a stop watch, lap time, an alarm... how much further for your trip, how many gallons more the trip will take, how much longer for the trip at your present average speed... yes, it gives you your average speed for the trip. You prefer it in metric, no strain... liters remaining, etc. Did we mention that it also has cruise control either at a speed set on the control board or at whatever speed you are traveling? The Compucruise will keep you busy and entertained during any trip... telling you more than you will ever want to know.

The Compucruise is not difficult to install... though it does connect to everything except the cigarette lighter. Until you've tried computerized travel, you haven't found out how much fun driving can be. It will work on any car not having fuel injection... and there is a front-wheel drive accessory gadget available for only \$4.40-#P001 (regularly \$5.50).

The price for the Compucruise is regularly \$199.95... and a bargain at that price. We'll sell you one of these fantastic gadgets for \$159.95 with cruise control (Model 44-#P002), and \$127.95 without (Model 41-#P003). Send money... and start having fun!

MOM'S

MAIL ORDER MICROS ✓ 158
Dept A80 • PO Box 427 • Marlboro NH 03455
Phone: (603) 924-3041



Steal Stopper

Ever had your car stolen?
The first reaction is one of disbelief...
... you know it was right there!

What you want is a modern combination lock on your ignition... The Steal Stopper. It's easy to install and almost impossible to defeat. You can by-pass it, if you want, for parking attendants or a car wash. Other than that, you get a secret four digit code and only will then be able to start the car... even if you have the keys in the ignition.

This protection retails for \$50... but we have a special for you at \$39.95. Don't procrastinate. Order #P004.

Note: This product works best on Detroit cars. Mazda RX7 owners must order additional module, #P008, which costs \$8. The Steal Stopper can be modified for Mercedes, Porsche, Ferrari, or other high performance European cars by returning unit to manufacturer with \$3. They promise quick modification and return.

SPECIAL 10% DISCOUNT

FROM LIST PRICES
SCOTT ADAMS ADVENTURES
FOR TRS-80 • SORCERER • APPLE

#1 ADVENTURELAND

YOU'LL WANDER THROUGH AN ENCHANTED LAND ENCOUNTERING WILD ANIMALS AND MAGICAL BEINGS WHILE YOU TRY TO RECOVER LOST TREASURES.
Order #SA001T for TRS Level II 16K, #SA001S for Sorcerer 16K, #SA001A for Apple 24K—\$13.45 each, on cassette.

#2 PIRATE ADVENTURE

SAIL TO TREASURE ISLAND AND TRY TO RECOVER LONG JOHN SILVER'S LOST TREASURES.
Order #SA002T for TRS Level II 16K, #SA002S for Sorcerer 16K, #SA002A for Apple 24K—\$13.45 each, on cassette.

#3 MISSION IMPOSSIBLE ADVENTURE

SAVE THE WORLD'S FIRST AUTOMATED NUCLEAR REACTOR WHEN YOU COMPLETE YOUR MISSION.
Order #SA003T for TRS Level II 16K, #SA003S for Sorcerer 16K, #SA003A for Apple 24K—\$13.45 each, on cassette.

#4 VOOODOO CASTLE

SAVE COUNT CRISTO FROM THE FIENDISH CURSE OR FOREVER BE DOOMED—BEWARE THE VOOODOO MAN.
Order #SA004T for TRS Level II 16K, #SA004S for Sorcerer 16K, #SA004A for Apple 24K—\$13.45 each, on cassette.

#5 THE COUNT

LOVE AT FIRST BYTE FROM YOUR BIG BRASS BED IN TRANSYLVANIA.
Order #SA005T for TRS Level II 16K, #SA005S for Sorcerer 16K, #SA005A for Apple 24K—\$13.45 each, on cassette.

#6 STRANGE ODYSSEY

YOU'RE MAROONED AT THE GALAXY'S EDGE AND DISCOVER RUINS OF AN ANCIENT ALIEN CIVILIZATION AND TRY TO COPE WITH UNEARTHLY TECHNOLOGIES WHILE YOU AMASS FABULOUS TREASURES.
Order #SA006T for TRS Level II 16K, #SA006S for Sorcerer 16K, #SA006A for Apple 24K—\$13.45 each, on cassette.

#7 MYSTERY FUN HOUSE

FIND YOUR WAY THROUGH THE STRANGEST FUN HOUSE BEFORE THE WEIRD PARK CLOSES.
Order #SA007T for TRS Level II 16K, #SA007S for Sorcerer 16K, #SA007A for Apple 24K—\$13.45 each, on cassette.

#8 PYRAMID OF DOOM

AN EGYPTIAN TREASURE HUNT THROUGH A NEWLY UNCOVERED PYRAMID. COMPLETE WITH ANCIENT CURSE.
Order #SA008T for TRS Level II 16K, #SA008S for Sorcerer 16K, #SA008A for Apple 24K—\$13.45 each, on cassette.

BRAND NEW* TRS-80 LEVEL II 16K and accessories at FANTASTIC SAVINGS

LEVEL II 16K COMPLETE.....	\$730 #TRS-001
16K EXPANSION UNIT.....	\$425 #TRS-002
32K EXPANSION UNIT.....	\$525 #TRS-003
DISK DRIVES.....	\$425 each (Specify which drive you want) #TRS-004
FRICITION MODEL PRINTER.....	\$889 #TRS-005
TRACK MODEL PRINTER.....	\$1350 #TRS-006

TERMS: Shipment normally within one week of receipt of your order (with cashier's check, money order, or credit card) for microcomputer and three weeks for accessories (checks take two weeks extra to clear bank). ADD \$2.50 PER ITEM for HANDLING. Everything will be sent to you with UPS freight charges COLLECT.

***NOT UPGRADED USED OR RECONDITIONED LEVEL I's WITH OLD KEYBOARDS BUT BRAND SPANKING NEW TRS-80's IN FACTORY CARTONS WITH FULL FACTORY WARRANTY! COMPARE PRICES AND QUALITY AND ORDER FROM MOM'S.**

INSTANT SOFTWARE HALF PRICE SPECIAL CLOSEOUT—ONLY \$4

TRS-80, Level I, Games

Knights Quest/Robot Chase 4K-#SI0003.
Cave Exploring 16K-#SI0010.
Doodles & Display 16K-#SI0030.
Fun Package I 16K-#SI0041.

TRS-80, Level I, Finance

Status of Homes 4K-#SI0012.

TRS-80, Level II, Hobby

Model Rocketry Analyzer-#SI0024.

HEAD ALIGNMENT KIT

Best cassette recorder tape head alignment kit available. Solves loading problems. #K001-only \$9.95.

MOM'S SOFTWARE SPEED READING COURSE

Could be the most important program you'll ever buy.

Only \$5 per cassette.

Order #R2001.

HONEYWELL

15 Honeywell ASR-33 Communications Consoles with TTY, paper tape reader and punch. Used, working when removed from service. Shipped freight collect or you pick up. Weight 300 lbs. \$395. Order #P006.

PANASONIC TAPE DECKS

Panasonic RS261 US Stereo Cassette Decks—with auto-stop, record level adjust, VU meters, used condition; all have had heads replaced and aligned. #T001-\$50.

Panasonic RS260 US Stereo Cassette Decks—same as above, but also has bias switch for chrome tapes. #T002-\$50.

TERMS: FOB Marlboro, NH USA. Limited stock; everything guaranteed as described; you pay postage on returns. PRINT orders clearly. Minimum order \$10 plus \$2.50 shipping and handling charge in US—only DOUBLE THAT ELSEWHERE. Orders over \$50 add 5% for shipping in USA; 10% elsewhere (we will refund excess). Orders shipped UPS or insured mail only. No CODs please. Send US funds by check or money order. For credit card purchases, add 4%, list AE, MC or VISA, number, and expiration MOM's, Department A80, PO Box 427, Marlboro NH 03455

80 PREVIEW

WHAT TO LOOK FOR IN THE MAY 80

MASS STORAGE ALTERNATIVES

Until recently you could only use slow (but cheap) cassettes, or fast (but expensive) disks as mass storage on your TRS-80. Now you have alternatives, the Stringy Floppy from Exatron and the Beta-80 transport from Meca. Find out what they can do, and how they do it—in the May issue of your favorite magazine.

LANGUAGES

Parlez-vous BASIC? FORTRAN? C? Forth? Pascal? English? The list goes on, more and more computer languages are becoming available for the TRS-80 system. What advantages do languages other than BASIC have, and how do they work? Next month we shed light on some of the non-basic languages.

CAR-POOLING

With the price of gasoline reaching new heights, more people than ever are thinking of carpooling. This program can be used to find those who are close enough together to consider this energy saving transportation method.

LEVEL I TAPE MONITOR

Having trouble finding the correct volume setting for different tapes? This neat utility displays a continuous graph, to indicate at which level the data is OK. Adjust your volume in real time, and save time.

BUSINESS PROGRAMS

Good business software is hard to find, but the demand is virtually insatiable. What needs to be thought out in business programs, and how do you go about making them people-proof? Remember that the end user probably doesn't know a PEEK from a POKE, and if the software crashes so might the business. Read how one programmer approaches the problem, in the next issue of 80.

ALL THIS PLUS MUCH MORE!

80 ADVERTISERS

RS Number	Page	RS Number	Page	RS Number	Page
81 A B Computers.....	132	223 Designco.....	125	53 LNW Research.....	119
34 Acorn Software Products, Inc.....	51	139 Design Enterprises of S. F.....	105	14 Level IV Products, Inc.....	4
97 Adventure International.....	53	222 Digibyte Systems Corp.....	113	162 Level IV Products, Inc.....	28
69 Alpha Byte Storage.....	120	88 Documan Software.....	135	15 Lobo Drives International.....	11
124 Alphatecs.....	127	80 Microcomputing.....		198 MSDI, Inc.....	85
210 Alpha Product Company.....	64	35, 96, 142, 143, 144		164 Mad Hatter Software.....	28
138 The Alternate Source.....	92	58 Electronic Specialists, Inc.....	119	213 Management Services.....	92
47 Applied Economic Analysis.....	69	26 Electronic Systems.....	139	87 Management Systems Software.....	70
48 Automated Simulations.....	107	40 Esmark Incorporated.....	71		135
146 Audio-Video Systems.....	92	163 Eventide.....	28	90 Manhattan Software, Inc.....	85
49 Basics & Beyond, Inc.....	119	3 Exatron.....	Cov. IV	71 McClain & Associates, Inc.....	102
122 Bill Archbold Electronics.....	113	141 F.E.C. Ltd.....	76	128 Med Systems Software.....	42
6 The Bottom Shelf, Inc.....	19	175 F.E.C. Ltd.....	29	104 Mercer Systems, Inc.....	109
57 Bourrut Consulting Corp.....	73	12 F.M.G. Corporation.....	55	50 Meta Technologies Corp.....	6, 7
94 Brown Graphic Press.....	132	224 Fantastick Software.....	125	212 Micon Micro Systems.....	81
145 C&S Electronics Mart, Ltd.....	125	133 Full Service Accounting & Processing.....	125	54 Micro Architect.....	57
Calsoft.....	66			214 The Micro Clinic.....	127
195 Cecdat, Inc.....	34	203 G.P. Associates.....	99	28 Microcomputer Technology/	
62 Cecdat, Inc.....	72	204 G.P. Associates.....	99	Apparat, Inc.....	50
46 Checks To-Go.....	75	206 Garner's Computer Center.....	105	186 Micro Decision Systems.....	109
32 CLOAD Magazine, Inc.....	76	75 Godbout Electronics.....	75	72 Micro Management Systems, Inc.....	144
100 Compucover.....	113	218 Good-Lyddon Data Systems.....	129		102
199 Computer Case Company.....	78	93 Granite State Instrument Company.....	135	68 Micro Matrix.....	102
174 Computer Case Company.....	29			29 Micro-Mega.....	48
215 Computer City.....	94	165 H&H Trading Company.....	28	73 Micron, Inc.....	127
130 Computer Generated Data.....	105	23 Hobby World Electronics.....	137	112 Miller Microcomputer Services.....	42
173 Computermat.....	29	13 Houston Micro-Computer Technology.....	13	24 Mini Micro Mart.....	140, 141
9 Computronics, Inc.....	82, 83, 88, 89	103 Howe Software.....	87	221 MISOSYS.....	113
10 Contract Service Associates.....	79	37 IJG, Incorporated.....	44	158 MOM's.....	145
171 The Corvus Mirror.....	29	2 Instant Software, Inc.....		144 Mumford Micro Systems.....	46
52 Cost Effective Computer Services.....	120	202 Interactive Microware, Inc.....	74	143 NEECO.....	97
119 Crown Plastic Co.....	81	187 International Software Associates.....	102	* NRI Schools.....	93
160 Crown Plastic Co.....	127	190 JPC Products Company.....	22	142 National Tricor, Inc.....	85
51 Cryptext Corporation.....	73	155 J R Software.....	78	216 National Tricor, Inc.....	135
7 Custom Computer Center, Inc.....	25	193 Joe Computer.....	132	116 Newby Software Development Co.....	92
121 Custom Electronics, Inc.....	113	85 Johnson Associates.....	99		
* Cybernetics, Inc.....	72	192 John Wiley & Sons, Inc.....	57	194 New England Business Service, Inc.....	65
134 DAR Sales.....	92	157 Kemco.....	3	74 Northeast Microware.....	129
59 DC Software & Computer Products.....	105	* Kilobaud Microcomputing.....	119	108 Orthon Computer.....	109
166 Datacomp.....	29	149 Kogyosha.....	127	96 Patient Care Data Service.....	135
44 Data Train, Inc.....	99			207 Pensadyne Computer Services.....	107

RS Number	Page
1 Percom Data Co., Inc.....	Cov. II
43 The Peripheral People.....	85
21 Programma International, Inc.....	67
41 Racet Computers.....	44
172 Racet Computers.....	29
5 Radio Shack.....	33
64 Radio Shack Authorized Sales Center.....	120
17 Realsoft/The Program Store.....	63
70 REMsoft, Inc.....	125
191 Rondure Company.....	61
168 SJW, Inc.....	29
154 S&M Systems, Inc.....	74
131 S-Systems.....	81
132 Sawyer Software.....	127
91 Scott Instruments.....	135
19 Simutek.....	117
67 Sirius Systems.....	101
18 Small Business Systems Group.....	87
30 Small System Software.....	87
42 Software, Etc.....	75
109 The Software Farm.....	109
189 Statcom, Inc.....	101
82 Sturdivant and Dunn, Inc.....	85
217 Sumware.....	129
211 Synergistic Solar, Inc.....	92
197 Systems Specialists (RCR).....	81
219 TRS-80 Exchange.....	109
148 Tab Sales Company.....	99
45 Taranto & Associates, Inc.....	43
167 Tarzac Systems.....	29
174 Task Computer Applications.....	113
220 Task Computer Applications.....	78
208 Technology Plus Corp.....	120
205 3-G Company, Inc.....	61
136 Typewriters Unlimited.....	42
84 Ultimate Computer Systems.....	120
Univair, Inc.....	109
31 V R Data Corporation.....	129
65 The Vista Computer Company.....	36, 37
27 Web Associates.....	111

* Reader Service inquiries not honored. Please contact advertiser directly.

READER SERVICE

This card is valid until July 31, 1980

Please help us to bring you a better magazine—by answering these questions.

I. What is your age?

- ☐ A. under 18
☐ B. 18-22
☐ C. 23-40
☐ D. 41-60
☐ E. over 60

II. What is your occupation?

- ☐ 1. Professional
☐ 2. Engineer
☐ 3. Data processing
☐ 4. Business
☐ 5. Education
☐ 6. Technician
☐ 7. Student
☐ 8. Other

III. What are your primary applications of your TRS-80 (check only two)?

- ☐ A. Business
☐ B. Games
☐ C. Home
☐ D. Education
☐ E. Scientific
☐ F. Control
☐ G. Music

IV. Your TRS-80, is it a

- ☐ 1. Level I
☐ 2. Level II
☐ 3. Model II
☐ 4. Don't own one yet

V. What peripherals do you have (check all that apply)?

- ☐ A. Expansion interface
☐ B. Disk
☐ C. Printer

VI. How much have you spent on hardware?

- ☐ 1. less than \$500
☐ 2. \$500-1,000
☐ 3. \$1,000-2,000
☐ 4. \$2,000-4,000
☐ 5. \$4,000-6,000
☐ 6. more than \$6,000

VII. How much have you spent on software?

- ☐ A. less than \$100
☐ B. \$100-250
☐ C. \$250-500
☐ D. \$500-1,000
☐ E. more than \$1,000

VIII. What is your level of education?

- ☐ 1. Post-graduate
☐ 2. College
☐ 3. High school

IX. How many people read your copy of 80 Microcomputing?

- ☐ A. 1
☐ B. 2
☐ C. 3
☐ D. 4 or more

X. If you are not a subscriber please circle number 500.

Reader Service: To receive more information from any of the advertisers in this issue of 80 Microcomputing, circle the number on the postage-paid Reader Service Card that corresponds with the Reader Service number on the ad in which you are interested. You will find numbers, preceded by a ✓, near the logo of each advertiser. Complete the entire card, drop into a mailbox and in 4-6 weeks you will hear from the advertiser directly.

1	6	11	16	21	126	131	136	141	146	251	256	261	266	271	376	381	386	391	396
2	7	12	17	22	127	132	137	142	147	252	257	262	267	272	377	382	387	392	397
3	8	13	18	23	128	133	138	143	148	253	258	263	268	273	378	383	388	393	398
4	9	14	19	24	129	134	139	144	149	254	259	264	269	274	379	384	389	394	399
5	10	15	20	25	130	135	140	145	150	255	260	265	270	275	380	385	390	395	400
26	31	36	41	46	151	156	161	166	171	276	281	286	291	296	401	406	411	416	421
27	32	37	42	47	152	157	162	167	172	277	282	287	292	297	402	407	412	417	422
28	33	38	43	48	153	158	163	168	173	278	283	288	293	298	403	408	413	418	423
29	34	39	44	49	154	159	164	169	174	279	284	289	294	299	404	409	414	419	424
30	35	40	45	50	155	160	165	170	175	280	285	290	295	300	405	410	415	420	425
51	56	61	66	71	176	181	186	191	196	301	306	311	316	321	426	431	436	441	446
52	57	62	67	72	177	182	187	192	197	302	307	312	317	322	427	432	437	442	447
53	58	63	68	73	178	183	188	193	198	303	308	313	318	323	428	433	438	443	448
54	59	64	69	74	179	184	189	194	199	304	309	314	319	324	429	434	439	444	449
55	60	65	70	75	180	185	190	195	200	305	310	315	320	325	430	435	440	445	450
76	81	86	91	96	201	206	211	216	221	326	331	336	341	346	451	456	461	466	471
77	82	87	92	97	202	207	212	217	222	327	332	337	342	347	452	457	462	467	472
78	83	88	93	98	203	208	213	218	223	328	333	338	343	348	453	458	463	468	473
79	84	89	94	99	204	209	214	219	224	329	334	339	344	349	454	459	464	469	474
80	85	90	95	100	205	210	215	220	225	330	335	340	345	350	455	460	465	470	475
101	106	111	116	121	226	231	236	241	246	351	356	361	366	371	476	481	486	491	496
102	107	112	117	122	227	232	237	242	247	352	357	362	367	372	477	482	487	492	497
103	108	113	118	123	228	233	238	243	248	353	358	363	368	373	478	483	488	493	498
104	109	114	119	124	229	234	239	244	249	354	359	364	369	374	479	484	489	494	499
105	110	115	120	125	230	235	240	245	250	355	360	365	370	375	480	485	490	495	500

Name _____

Address _____

City _____ State _____ Zip _____

80 Microcomputing • April 1980

BOOKS

Please send me the following 80 Microcomputing products:

Qty.	Catalog #	Title	Unit Price	Total

Add \$1 shipping/handling _____

Total _____

Enclosed \$ _____ ☐ Check ☐ M.O.

Bill: ☐ AE ☐ MC ☐ Visa

Card# _____ Exp. Date _____

Name _____

Address _____

City _____

State _____ Zip _____

Please allow 4-6 weeks for delivery

SUBSCRIPTION

80 Microcomputing subscribers
SAVE UP TO 50% OFF
the newsstand price!

Please allow 4-6 weeks for delivery

☐ New subscription ☐ Renewal

☐ 1 year—\$15 ☐ 2 years—\$24 ☐ 3 years—\$36

Enclosed \$ _____ ☐ Check ☐ M.O.

Bill: ☐ MC ☐ Visa ☐ AE ☐ me

Card # _____ Exp. date _____

Name _____

Address _____

City _____ State _____ Zip _____

Canada: \$15 per year, US funds
Other foreign: \$26 one year only, US funds

304B9



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

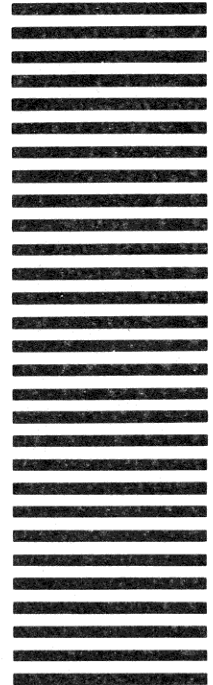
BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 217 CLINTON IA 52735

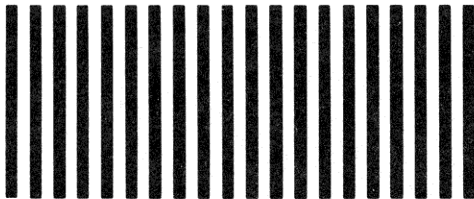
POSTAGE WILL BE PAID BY ADDRESSEE



POB 2743
Clinton IA 52735



NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



BUSINESS REPLY CARD

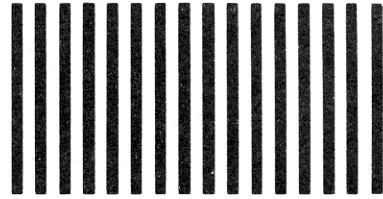
FIRST CLASS PERMIT NO. 780 FARMINGDALE NY 11737

POSTAGE WILL BE PAID BY ADDRESSEE



Subscription Dept.
POB 981
Farmingdale NY 11737

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES



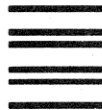
BUSINESS REPLY CARD

FIRST CLASS PERMIT NO. 80 PETERBOROUGH NH 03458

POSTAGE WILL BE PAID BY ADDRESSEE



Peterborough NH 03458



Att. Mail Order

Ask for Instant Software at a computer store near you.

Alabama

Anderson Computers
3156 University Dr., Huntsville
Computerland of Huntsville
3020 University Dr., Huntsville
Olensky Bros.
3763 Airport Blvd., Mobile

Arizona

Ham Shack
4506-A N. 16th St., Phoenix
Millets TV & Radio
621 East Broadway, Mesa

California

Byte Shop of Fairfield
87 Marina Center St., Suisun City
Byte Shop
8038 Clairmont Mesa Blvd., San Diego
Byte Shop of Mt. View
1415 West El Camino Real, Mt. View
Byte Shop of Sacramento
6041 Greenback Ln., Citrus Heights
Capital Computer Systems
3396 El Camino Ave., Sacramento
Computers Made Easy
819 East Ave. Q-9, Palmdale
Computer Store of San Leandro
701 MacArthur Blvd., San Leandro
Computer World
6791 Westminster Ave., Westminster
Computerland
16720 S. Hawthorne, Lawndale
Computerland of W. LA
6840 La Cienega Blvd., Inglewood
Coast Electronics
3118 N. Main St., Morro Bay
Computerland
24001 via Fabricante No 904, Mission Viejo
Hobbi-tronics
1378 So. Bascom Ave., San Jose
Hobby World
19511 Business Ctr. Dr., Unit 6, Borthridge
I.C.E. House Inc.
398 North E. St., San Bernardino
Jade Computer Products
4901 W. Rosecrans, Hawthorne
Opamp/Technical Books
1033 N. Sycamore Ave., Los Angeles
Q.I. Computers, Inc.
15818 Hawthorne Blvd., Lawndale
Radio Shack Dealer
8250 Mira Mesa Blvd., San Diego
Santa Rosa Computer Center
604 7th St., Santa Rosa
Silver Spur Elect. Comm.
13552 Central Ave., Chino
The Computer Store
820 Broadway, Santa Monica
Colorado
Byte Shop
3464 S. Acoma St., Englewood
Colorado Computer Systems
311 W. 74th Ave., Westminster
Computerland of North Denver
8749 Wadsworth Blvd., Arvada
The Computer Store
2300 Welton St., Denver
Connecticut
American Business Computers
454 Thames St., Groton
Computerlab
130 Jefferson, New London
Computerland
1700 Post Rd., Fairfield
Computer Works
1439 Post Rd. E., Liberty Plaza, Westport
D.C.
The Program Store
4200 Wisconsin Ave., N.W., Washington, D.C.
Florida
Adventure International
200 Bald Cypress Ct., Longwood
AMF Electronics
11146 N. 30th St., Tampa
Boyd-Ebert Corporation
1328 West 15th St., Panama City
Computer Center
6578 Central Ave., St. Petersburg

Computerland of Ft. Lauderdale
3963 N. Federal Hwy., Ft. Lauderdale
Computerland of Jacksonville
2777-6 University Blvd. W., Jacksonville
Computer Shack
3336 Beach Blvd., Jacksonville
Curtis Waters Enterprises
236 Talbot Ave., Melbourne
Heath Kit Electronic
4705 W. 16th Ave. Center, Hialeah
HIS Computeration
1295 Cypress Ave., Melbourne
Sound Ideas
2201-C N.W. 13th, Gainesville
Ukatan Computer Store
Airport Rd., Destin
Williams Radio & TV Inc.
2062 Liberty St., Jacksonville
Georgia
Atlanta Computer Mart
Atlanta
Computerland of Atlanta
2423 Cobb Parkway, Smyrna
Hawaii
Computerland of Hawaii
567 N. Federal Hwy., Honolulu
Radio Shack Assoc. Store
1712 S. King St., Honolulu
Idaho
Electronic Specialists
8411 Fairview Ave., Boise
Illinois
Bloomington Normal
Computer Works
124 E. Beaufort, Normal
Computerland
4507 North Sterling, Peoria
Computer Station
3659 Nameoki Rd., Granite City
Midwest Micro Computers, Inc.
708 S. Main St., Lombard
Indiana
Computer Center of South Bend
51591 US 31 North, South Bend
Data Domain
221 W. Dodds, Bloomington
Iowa
Memory Bank
4128 Brady St., Davenport
Kansas
Central Kansas Computers
6 S. Broadway, Herington
Louisiana
Computer Shoppe Inc.
3225 Danny Park, Suite 222, Metairie
Maine
Radio Shack
315 Main Mall Rd., So. Portland
Maryland
Jack Fives Electronics
4608 Deblen Circle, Pikesville
The Comm Center
9624 Ft. Meade Rd., Laurel
Massachusetts
ComputerCity
175 Main St., Charlestown
ComputerCity
50 Worcester Rd., Framingham
Computerland of Boston
214 Worcester Rd., Wellesley
Computer Packages Unlimited
244 W. Boylston St., West Boylston
Lighthouse Computer Software
14 Fall River Ave., Rehoboth
New England Electronics Co.
679 Highland Ave., Needham
The Computer Store
120 Cambridge St., Burlington
Tufts Radio & Electronics
206 Mystic Ave., Medford
Michigan
Computer Center
28251 Ford Rd., Garden City
Computer Connections
38437 Grand River, Farmington Hills
Computerland of Grand Rapids
2927 28th St. S.E., Kentwood
Computerland of Rochester
301 S. Livernois, Rochester
Computerland of Southfield
29673 Northwestern Hwy., Southfield

Computer Mart
560 W. 14 Mile Rd., Clawson
Hobby House
1035 W. Territorial Rd., Battle Creek
Ye Olde Teacher Shoppe
1823 Witmyre St., Ypsilanti
Minnesota
Computerland of Hopkins
11319 Hwy F., Hopkins
Minnesota Software Inc.
5422 Fisher St., White Bear Lake
Zim Computers
5717 Xerxes Ave., N. Brooklyn Center
Mississippi
Dyer's, Inc.
200 E. Main St., West Point
Missouri
Computervan, Inc.
51 Florissant Oaks Shopping Center
Florissant
Consolidated Software
16501 Greenwald Court, Belton
Montana
Intermountain Computer
529 So. 9th St., Livingston
Personal Computer
121 Red Oak Dr., Carl Junction
The Computer Store
1216 16th St. W. #35, Billings
Nebraska
Computerland of Omaha
11031 Elm St., Omaha
Midwest Computer Co. Inc.
8625 1 St., Omaha
Midwest Computer Co. Inc.
4442 S. 84th St., Omaha
Midwest Computer Co. Inc.
4403 S. 87th St., Omaha
Nevada
Century 23
4566 Spring Mountain Rd., Las Vegas
New Hampshire
Bitsnbytes Computer Center
568 Pleasant St., Concord
ComputerCity
1525 S. Willow, Manchester
Portsmouth Computer Center
31 Raynes Ave., Portsmouth
Radio Shack Assoc. Store
Fairbanks Plaza, Keene
New Jersey
Computer Encounter
2 Nassau St., Princeton
Computerland
35 Plaza Rte. #4, W. Paramus
Computer Mart of NJ
501 Rte. 27, Iselin
Dave's Electronics
Pennsville Shopping Ctr., Pennsville
Lashen Electronics Inc.
21 Broadway, Denville
Personal Computing Inc.
51 Central Sq., Linwood
Radio Shack/J&J Electronic
Mansfield Shopping Ctr.
Rt. 57 Allen Rd., Hackettstown
The Bargain Brothers
Glen Roc Shopping Center
216 Scotch Road, Trenton
The Computer Emporium
Bldg. 103, Avenues of Commerce
2428 Rte. 38, Cherry Hill
New Mexico
Antel Electronics Co.
232 Wisconsin N.E., Albuquerque
Legey and Associates
2908 Tahiti Ct. N.E., Albuquerque
Mitchell's Music (Radio Shack)
407 W. Church, Carlsbad
South West Computer Center
121 Wyatt Drive, Suite 7, Las Cruces
New York
Aristo Craft
314 Fifth Ave., NYC
Bits & Bytes
2800 Straight Rd., Fredonia
Computer Corner
200 Hamilton Ave., White Plains
Computer Era Corp.
1570 3rd Ave., New York
Computer Factory
485 Lexington Ave., NYC

Computer House, Inc.
721 Atlantic Ave., Rochester
Computerland of Nassau
79 Westbury Ave., Carle Place
Computer World
519 Boston Post Rd., Port Chester
Comtek Electronics, Inc.
2666 Coney Island Ave., Brooklyn
Comtek Electronics, Inc.
Staten Island Mall
Store 220A, Staten Island
Home Computer Center
671 Monroe Ave., Rochester
Key Electronics
Schenectady
Mr. Computer
Imp. Plaza, Rte. 9, Wappingers Falls
Softtron Systems
308 Columbia Turnpike, Rensselaer
The Computer Tree Inc.
409 Hooper Rd., Endwell
Update Computer Shop
629 French Rd., Campus Plaza
New Hartford
North Carolina
Byte Shop of Raleigh
1213 Hillsborough St., Raleigh
Ohio
Altair Business Systems, Inc.
5252 North Dixie Dr., Dayton
Astro Video Electronics
504 E. Main St., Lancaster
Cincinnati Computer Store
4816 Interstate Dr., Cincinnati
Computerland
4579 Great Northern Blvd., N. Olmstead
Computerland
6429 Busch Blvd., Columbus
Computerland
1288 Som Rd., Mayfield Heights
Computer Store of Toledo
18 Hillwyck Dr., Toledo
Forbes Microsystems Inc.
35 N. Broad, Fairborn
Microcomputer Center
7900 Paragon Rd., Dayton
Micro-Mini Computer World
74 Robinwood, Columbus
Universal Amateur Radio, Inc.
1280 Aida Dr., Columbus
Oklahoma
Sounds, Etc.
Hwy. 33, Watonga
Vern Street Products
Radio Shack Dealer
114 W. Taft St., Sapulpa
Oregon
Computerland of Portland
12020 S.W. Main St., Tigard
Computer Pathways Unlimited, Inc.
2151 Davor St. S.E., Salem
Pennsylvania
Audio Mart
518 Fifth Ave., New Brighton
Artco Elect.
302 Wyoming Ave., Kingston
Artco Elect.
Back Mountain Shop. Ctr.
Shavertown
Computer Workshope
3848 William Penn Hwy, Monroeville
Computerland of Harrisburg
4644 Carlisle Pike, Mechanicsburg
Erie Computer Co.
2127 West 8th St., Erie
Mighty Byte Computer Center
537 Easton Rd., Hersham
Personal Computer Corp.
24-26 West Lancaster Ave., Paoli
Personal Computer Corp.
Frazer Mall, Lancaster Ave., Frazer
Rhode Island
Computer City
165 Angell St., Providence
South Dakota
CB Radio Shack
21st and Broadway, Yankton
Tennessee
Computerlab
671 S. Menden Hall Rd., Memphis
H & H Electronics Inc.
509 N. Jackson St., Tullahoma
Texas
Computer Port
926 N. Colling, Arlington
Houston Microcomputer Tech.
5313 Bissonnet, Bellaire

K.A. Elect.
9090 Stemmons Frwy., Dallas
Pan American Elect. Inc.
1117 Conway, Mission
Ram Micro Systems
6353 Camp Bowie Blvd., Ft. Worth
Utah
Quality Technology
470 E. 2nd So., Salt Lake City
Virginia
Home Computer Center
2927 Virginia Beach Blvd.
Virginia Beach
Southside Radio Comm.
135 Pickwick Ave., Colonial Heights
Washington
American Mercantile Co. Inc.
2418 1st Ave. S., Seattle
Computerland of South King Co.
1500 S. 336 St., Suite 12
Federal Way
Magnolia Micro Systems
2812 Thorndyke Ave., Seattle
Personal Computers
S 104 Freya, Spokane
Ye Old Computer Shop
1301 G. Washington, Richland
West Virginia
The Computer Corner Inc.
22 Beechurst Ave., Morgantown
The Computer Store
Municipal Parking Bldg., Charleston
Wisconsin
Byte Shop Of Milwaukee
6019 West Layton Ave., Greenfield
Petted Microsystems
4265 W. Loomis Rd., Milwaukee

Puerto Rico
The Microcomputer Store
1568 Ave. Jesus T. Pinero
Caparra Terrace
Canada
CANADIAN DISTRIBUTORS:
Micron Distributing
409 Queen St., W. Toronto, Ont.
MSV 2A5
Computerland of Winnipeg
715 Portage Ave., Winnipeg, Man.
Compumart
411 Roosevelt Ave., Ottawa, Ontario
Computer Mart Ltd.
1055 Yonge St., Suite 208
Toronto, Ontario
Galactica Computers
103rd Ave., Edmonton, Alberta
Micromatic Systems Inc.
101 8136 Park Rd., Richmond, B.C.
Micro Shack of W. Canada
333 Park Street, Regina, Sask.
Orthon Holdings Ltd.
12411 Stony Plain Road
Edmonton, Alberta
Total Computer Systems
Ajax, Ontario
England
Tamays & Farr Ltd.
4 Morgan St., London
France
Sided
45 Rue de la Chapelle, Paris
Sivea s.a.
20, Rue de Leningrad, Paris
Italy
HOMIC s.r.l.
Piazza De Angeli 1, Milano
West Germany
Electronic Hobby Shop
Kaiserstr. 20, Bonn
MicroShop Bodensee
Marktstr. 3, 7778 Markdorf
Australia
Computerware
62 Paisley St., Footscray VIC
Deforest Software
36 Glen Tower Drive
Glen Waverly, VIC.
Softronics Micro Systems
Lindfield
Sure-Load Software
P.O. Box 26, Weston, A.C.T.
South Africa
Eddie Talberg
P.O. Box 745, Johannesburg

Instant Software™ Inc.

Peterborough, New Hampshire 03458 603-924-7296



STARTER KIT

EXATRON STRINGY FLOPPY FOR THE TRS-80

Recommended initial purchase:

Exatron Stringy Floppy with Level III BASIC	\$249.50
5 Wafers each: 5', 10', 20', 50'	40.00
Bus Extender, 2-for-1	15.00
ESF Machine Language Monitor	9.95
(Plus shipping and tax if applicable)	\$314.45

SPECIAL PRICE FOR THIS STARTER KIT	\$299.50
Sales Tax (California only)	
Shipping and Handling	3.00
TOTAL	

For more information see the current Exatron Stringy Floppy Owners Association Newsletter in *Microcomputing*.

If you have any questions about the product, about Exatron, or ESFOA, please call the Hot Line. Address letters to ESFOA, 3559 Ryder St., Santa Clara, CA 95051.

Stringy Floppy is a trademark of Exatron Corporation.

HOT LINE (For Calls Outside CA)

800-538-8559



excellence in electronics

exatron

3555 Ryder Street ■ Santa Clara, California 95051
(408) 737-7111